Vol. LXI JUNE, 1922 New Series Vol. 14, No. 3

JOURNAL of the American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

[Original Official Organ U. S. Vet. Med. Ass'n.]

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association

CONTENTS

Editorial 331

Papers:

Hemorrhagic Septicemia—C. J. Marshall 233

Treatment of Retained Placenta in Cows—George W. Grim 243

Sterility of Cattle—E. C. Deubler and M. F. Barnes 254

Experience in Practice with Udder Troubles—John P. Turner 259

The Importance of Bacillus Abortus as Compared with that of Other Invaders—O. E. Jorgenson 273

Miscellanea Anatomica. I. Remarks on Anatomical Instruction and Study—Suptimus sisson 277

The Presence of Diphtheria Antitoxin in the Blood of Certain Normal Horses and Its Demonstration by the Shick Test—H. W. Schoening 286

Why Does an Animal Affected with Glanders Give a Reaction When Injected with Mallein, While a Healthy Animal Does Not? R. A. Archibald 295

McIntosh and Fildes Method for Attaining Surface Growth of Obligate Anaerobes—William S. Goehenour 301

Davainea Proglottina, a Pathogenic Cestode, in American Poultry—Howard Crawley 305

Enterocolysis—William J. Lentz 311

Bacillus Botulinus in Swine Diseases—Robert Graham 316

Clinical and Case Reports:

Ossifying Periostitis in a Bull—Lee M. Roderick 317

Pussy's Perils—E. A. Weston 319

Overloading of Horse's Bowels with Corn—R. A. Dean 321

Caesarian Operation on a Bitch—R. A. Dean 323

Abstracts 325

Review 329

Army Veterinary Service 330

Association News 331

Communications 341

Miscellaneous 344

THE JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION is issued the first of each month. *Manuscripts and copy for insertion should be as nearly perfect as possible for the printer and should be received by the tenth of the preceding month to insure insertion in the next month's issue.* Volumes begin in April and October.

Communications relating to publication, subscription, advertisements and remittances should be addressed to JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, 1629 Hobart Street, Washington, D. C. Matters pertaining to the American Veterinary Medical Association and membership should be sent to Dr. N. S. Mayo, Secretary, 4758 Ravenswood Avenue, Chicago, Illinois.

$5.00 per annum Foreign $5.50; Canada $5.25 Single Copies 40 cts. in U. S.

Entered as Second-Class Matter, February 4, 1920, at the Post Office at Washington, D. C. under Act of March 3, 1879. Acceptance for mailing at special rate provided for in Section 1103, Act of October 3, 1917; authorized February 4, 1920.

HEAT CASES ARE COMING

Use

CAMPHOSOL

Read what one of the many satisfied veterinarians has to say:

Dear Doctor:

Last July 1st I used nothing but CAMPHOSOL subcutaneously on a 1,400 lb. horse suffering severely from heat stroke. In 1 hour he was up and went to work the following day.

On the same date I had a Boston terrier that was overcome by the heat, being wild and delirious. He was given a small dose of CAMPHOSOL and in 10 minutes he was quiet and rested easily throughout the night. The next morning he was all right.

On August 24th I was called to see a Scotch collie that was also suffering from heat stroke and was wild and delirious. I also gave him nothing but CAMPHOSOL and he recovered just as satisfactorily and quickly as the other dog.

I notice one good feature of your CAMPHOSOL is that it quiets that delirium which we so often meet in heat cases. This is no doubt due to the circulation and respiration being restored to normal so nicely by CAMPHOSOL.

DR. O. F. R., D. V. M.—Nebraska.

You will have the same results

Camphosol is an Aqueous, Isotonic, Colloidal, Camphor Solution. No Oil.

Milk Fever, Pneumonia, Collapse, Thumps, etc., all respond nicely to Camphosol.

BIOLOGICS FLAVISOL HEMOGEN

ZELL-STRAUB LABORATORIES, Inc.

(Originators and Sole Producers of FLAVISOL)

Masonic Temple **Chicago, Ill.**

DISTRIBUTORS:

OTTUMWA SERUM CO., Indianapolis, Ind.
GRAIN BELT SUPPLY CO., Omaha, Nebr. Mason City, Ia.
DANVILLE WHOLESALE DRUG CO., Danville, Ill.
GREAT WESTERN SERUM CO., Chicago, Ill.
DR. J. S. KOEN, Bloomington, Ill.
SHARP & SMITH, Chicago, Ill.
CORN BELT SERUM CO., East St. Louis, Ill.
ROCK VETERINARY SUPPLY CO., Jackson, Miss.
STANDARD LABORATORIES, Chicago, Ill.
CEDAR RAPIDS SERUM CO., Cedar Rapids, Ia.
GREGORY FARM LABORATORY, White Hall, Ill.
SOUTHEASTERN LABORATORIES, Atlanta, Ga.

JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

J. R. MOHLER, Editor, Washington, D. C.

A. T. KINSLEY, President, Kansas City, Mo. N. S. MAYO, Secretary, Chicago, Ill.
M. JACOB, Treasurer, Knoxville, Tenn.

Executive Board

GEO. HILTON, 1st District; T. E. MUNCE, 2nd District; S. E. BENNETT, 3rd District; J. A. KIERNAN, 4th District; C. E. COTTON, 5th District; B. W. CONRAD, 6th District; CASSIUS WAY, Member at Large

Sub-Committee on Journal

S. E. BENNETT J. A. KIERNAN

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXI, N. S. Vol. 14 June, 1922 No. 3

SALES POLICY OF COMMERCIAL HOUSES

AT THE PRESENT TIME the indications are that there will be a stormy session at the St. Louis meeting of the A. V. M. A. The question at issue involves the sales policy of commercial houses. As matters stand, we may look forward to a session of bitter personalities and intense partisan accusations. Before proceeding along this line, it might be advisable to examine this possibility closely and ascertain whether such a session will be profitable and whether the matter might be adjudicated dispassionately and in a manner calculated to avoid the aftermath of hard feelings and possible schisms in the ranks of the veterinary profession. If we examine the subject without bias, it seems that there is no necessity for the members of the profession in general aligning themselves with one party or another in an attitude of hostility to all who disagree with them. It appears that there are several angles to the subject and that the right is not wholly on the side of one or the other.

Primarily this matter is a matter of commercial policy, and commercial policy is determined by a commercial house on the basis of what is profitable. Doubtless other arguments carry

weight with commercial houses, but policies evidently unprofitable for a given house are not adopted. Commercial houses are not in business primarily to make drugs or instruments; they are in business to make money. Hence, if a house decides that it will sell to veterinarians only, it does so because it expects to get the support of veterinarians and thereby establish a profitable business. Similarly, if a house decides to adopt the older policy of selling to druggists it does so because experience shows that in the case of that house such a business is profitable. From the standpoint of the veterinarian, there are advantages and disadvantages to him in either of these policies. The policy of selling direct to the veterinarian has the evident advantage of preventing non-professional persons, commonly referred to as laymen or the laity, according to the taste of the speaker or writer, from purchasing drugs and instruments for their own use. The disadvantage of such a policy is that when drugs or instruments are desired by the veterinarian for immediate use, these things can not be purchased from the druggist who has found it unprofitable to carry a stock for the use of the veterinarian who does not patronize him except in such emergencies. The advantage and disadvantages are reversed in the case of the house adopting the policy of selling to the druggist. This does not cover the entire topic by any means, but it illustrates the fact that there are two sides to the question. An additional point is that involved in selling direct to the consumer. There are several aspects to this problem. For one thing, the commercial drug house is here in competition with chemical houses in selling such of its products as dips. The extensive use of such substances practically removes them from the category of drugs for general purposes. It may be taken for granted that a stockman will not get a prescription every time he dips his cattle for ticks or lice, or his sheep for scabies, and that he will buy his dips as cheaply as possible from the concern which offers them at the best figure.

Under these circumstances a line must doubtless be drawn somewhere. Where? That remains to be ascertained. The question which we raise at the present time is this: What is the best way to ascertain where the line should be drawn, what policies should be approved as right and practical, and what

policies should be disapproved and frowned on? Can we ascertain this best by a prolonged, stormy session of the A. V. M. A., flavored with personalities and consisting largely of views put forth by those having commercial interests in the matter and by other persons who have given little thought to all the aspects of the case? Many of those who attend the next meeting of the A. V. M. A. will do so with the idea of enjoying the professional papers and the social features which make up a large part of the benefit derived from the meetings. Must their enjoyment be largely curtailed by a rancorous debate? Is it necessary that the disagreements of commercial houses should occupy a large part of the session, especially when a decision in regard to these disagreements may be made, with little likelihood that the decision will be a sound and dispassionate one? It would hardly seem so. Would it not be better to take the position that the veterinarian, as an interested party, would prefer to have this topic referred to a suitable committee authorized to examine the facts in the case from the standpoint of all those directly or indirectly interested, and to have such a committee formulate recommendations and report them to the association for modification and adoption? A partisan alignment on the part of veterinarians will necessarily result in some of them playing the part of cat's-paw for interested individuals. On the other hand, if the veterinarians attend the meeting in a dispassionate frame of mind, recognizing the issue but asking that it be settled without a waste of time and without laying the foundation for prolonged subsequent bitterness, it may save much unpleasantness and lead to some constructive findings.

Would it not be advisable for President Kinsley to refer this problem, which is certain to confront us at St. Louis, to the Executive Board immediately, with the request that evidence on both sides be collected as early as possible, and that the board meet a day or two before the convention to consider the question at issue? Without doubt this controversy will prove to be the most troublesome item of business that will come before the conference and preliminary steps should at once be taken to have it settled promptly and with the greatest good to the veterinary profession. M. C. H.

PRACTICAL VETERINARIANS

NOW that the educational requirements for entrance to recognized veterinary colleges have been raised to meet the demands of modern educational standards, it is very important that the veterinary colleges of the country should emphasize the importance of the practical application of the veterinary training and particularly to those students who expect to practice in rural communities. If a farmer or stockman is a success, must be practical. Every rural community is critical and it measures a veterinarian very largely by its own standards. These standards have been developed by practical farm problems. It is a disgrace to a modern educational institution and a great handicap to the student to graduate veterinarians who are not thoroughly trained in the practical application of their professional training to modern farm and livestock conditions.

Some veterinary colleges in times past have required students to put in at least one vacation with a successful practitioner as a preceptor. If a student has not had practical experience in the breeding and handling of livestock before he enters a veterinary college, this practical training should be insisted upon by the college authorities, no matter how good a student he may be, as determined by academic standards. The English veterinary colleges make their final examinations intensely practical. This is as it should be. A student's progress can be measured very accurately by his daily work during the course of study, but his ability to apply his training to everyday veterinary problems should be determined by the college that gives him the training before it recommends him to the public as fitted to practice his profession.

There are some educators who seem to think that if a student makes good grades in the usual college courses, he is fitted to practice. This does not necessarily follow. The college should afford the opportunity for real practice and be sure the student is really qualified before the final seal of approval is granted.

State examining boards should above all things emphasize the practical problems that the candidate will have to meet in that state. They should know that he can properly handle serious problems.

In our efforts to secure a higher veterinary training in the colleges, let us also insist that it shall be better by combining the theoretical with the latest and best in practice. N. S. M.

CANADA ACCEPTS CERTIFICATES OF ACCREDITED VETERINARIANS

THE Veterinary Director General of Canada has approved an arrangement whereby the mallein test certificates issued by veterinary practitioners of the United States who are "accredited" for testing accredited herds will be accepted in admitting horses, mules and asses from the United States into Canada when indorsed by a Bureau inspector. Under this recent modification of the Canadian requirements veterinary practitioners who are eligible to administer the tuberculin tests in accredited-herd work are also eligible to administer the mallein test for animals about to be exported to Canada. Previously the accredited practitioners of the United States had, under similar conditions, been approved by Canada for testing cattle entering that country.

There were approximately 300 practicing veterinarians in the United States registered by the Bureau of Animal Industry to apply the mallein test to animals for export to Canada. In view of this recent arrangement with the Canadian authorities that list was abolished May 1, 1922. Thus the privilege of administering the mallein test for horse stock destined to Canada has been extended from 300 veterinary practitioners to approximately 5,000. The action of the Bureau and States in requiring veterinary practitioners to pass an examination in order to entitle them to participate in the cooperative tuberculosis eradication work was no doubt responsible for the modification of the Canadian requirements in regard to both the tuberculin and mallein testing of imported animals from the United States.

This change will also be advantageous to exporters of horse stock. Shipments in many cases consist of a few horses and several cattle. Under the previous requirements an accredited veterinarian while testing cattle on a farm for shipment to Canada was not authorized to make the mallein test of a horse unless he chanced also to be registered with the Bureau for the latter purpose. The shipper would then have had to seek the

services of such a registered practitioner in addition, in order to have both his cattle and horses accompanied by proper certificates. Therefore, Canada's recognition of the accredited veterinarian for both these lines of work should prove very gratifying to practitioner and shipper alike.

INCREASED APPROPRIATIONS FOR THE B. A. I.

IN the Agricultural Department appropriation act for the year beginning July 1, 1922, which was signed by the President on May 11, there were several increases in various items for the Bureau of Animal Industry. The appropriation covering the eradication of bovine tuberculosis was increased over the regular appropriation of last year by $898,800, all of this to go to the payment of indemnities for reacting animals slaughtered. The item of $978,800 for operating expenses has been reduced to $850,000. During this year the regular appropriation for indemnities was augmented by an emergency item of $600,000 made available last December. The entire amount covering the tuberculosis eradication work amounts to $2,877,600, of which $300,000 is available for use at once in order to insure that there will be no break in the work in States where the funds for the current year have been expended.

In the item for animal husbandry investigations an increase of $1,500 was provided to be used for the genetics project. An increasing accumulation of data along this line resulting from experimental work makes necessary a small additional sum to tabulate the figures and present the information in practical form. An increase of $5,600 also is made in the item for investigations of animal diseases. This sum will be added to the allotment of the Zoological Division and will be devoted to a further study of the internal parasites of hogs. A reduction of $5,000 is noted in the item for disease control, resulting from an added restriction that in the future blackleg vaccine may not be prepared and distributed by the Government.

PAPERS ON ANATOMY

A SERIES of short articles on anatomy by Dr. Septimus Sisson, Professor of Anatomy in the College of Veterinary Medicine of the Ohio State University, under the general title of

"Miscellanea Anatomica," begins in this issue of the JOURNAL. The first paper is intended as a sort of introduction, indicating the methods of modern anatomical study and instruction. It seems to be just dawning on the veterinary profession that anatomy has a very real and vital relationship to almost all of our professional activities. It is not unreasonable to say that within the last decade a most important revision of our anatomical ideas has taken place, just as it did in human anatomy a few years earlier. This should have a very decided influence on physical diagnosis and surgery in particular.

We are sure that these papers, written by a high authority in the field of veterinary anatomy, bringing together what the author terms "fragments" gathered in the past thirty years of his anatomical work, will not only prove interesting to our readers but will have the effect of directing to an important subject a larger measure of the attention that it deserves.

HEMORRHAGIC SEPTICEMIA [1]

By C. J. MARSHALL

School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa.

HEMORRHAGIC SEPTICEMIA manifests itself in a variety of forms in mammals and birds. As examples might be mentioned pneumonia of horses, cattle and calves; swine plague, fowl cholera, and a form of the disease in different species of animals, which is decidedly acute and fatal with no autopsy findings that would account for death. It is probable that the hemorrhagic septicemia group of diseases is as old as anthrax, contagious pleuropneumonia of cattle and many other well-known diseases, yet the literature on the subject is confined to recent times. Bubonic plague or Black Death of the Middle Ages is a form of this disease in man.

An intelligent understanding of hemorrhagic septicemia began in 1878, when Rivolta and Semner discovered the *Bacillus avisepticus*. Their discovery was verified by Pasteur two years later. Bollinger described the symptoms of the disease in 1878 in cattle and deer and called it Wild und Rinderseuche. The cause of the disease described by Bollinger was discovered by Kitt in 1883. The memorable work of Smith and de Schweinitz in reference to swine plague was started in this country in 1886. Much valuable information has been collected since this pioneer work began less than fifty years ago.

This class of organisms with their many biological characteristics have been called the bipolar or pasteurella group and appear to be the causative factor of the hemorrhagic septicemia class of diseases, which may be of a toxemic or septicemic nature and lead to a prompt and fatal ending or may occur in a less virulent, edematous, pectoral or intestinal type. Death is so sudden in certain forms and the autopsy findings so scanty that death has frequently been ascribed to poison or accidental causes. This form is often seen in cattle at pasture on new or wild land.

Hemorrhagic septicemia has many names of a local nature.

[1] Presented at the regular meeting of the Conestoga Veterinary Club, Lancaster, Pa., January 12, 1922.

In Pennsylvania it has been called the Carbon County disease, for the reason that it was prevalent in that county for many years.

Cornstalk disease has caused much speculation and confusion. *Hoard's Dairyman*, under date of November 25, 1921, in answer to a question about cornstalk disease, stated that it is attributed either to acute indigestion or as a result of too much coarse, indigestible feed or some poisoning substance in cornstalks. Dr. Pearson described an outbreak which occurred in 1896 at Kirkwood, Lancaster County, Pennsylvania. It was later considered to have been hemorrhagic septicemia. In "The Pathology of Infectious Disease of Animals," by Moore, published in 1908, it is suggested that cornstalk disease is a mysterious affection of cattle, which is probably caused by an intoxication from eating an excessive quantity of one or more elements existing in cornstalks themselves. It is rather significant that the more we learn about hemorrhagic septicemia the less we hear about cornstalk disease.

The pectoral form of hemorrhagic septicemia is occasionally seen in a herd of acclimated cattle. Those that have been shipped are more susceptible to it. It is often called shipping fever of cattle or stockyards pneumonia. In many respects it is quite similar to shipping fever in horses. The disease varies considerably in virulence in both species from an insignificant ephemeral fever to a fatal case of pleuropneumonia.

The pectoral form in cattle has often been mistaken for contagious pleuropneumonia or lung plague. In the fall of 1892 the Federal Government declared this country free from contagious pleuropneumonia. The last known case was slaughtered in New Jersey in the spring of 1892. In 1891 the disease was suspected in some American cattle that had been shipped to France and offered for sale at the abattoir La Villette. The disease was so similar to contagious pleuropneumonia that a special investigation was made by Nocard. He presented a report of his findings in July of the same year at a meeting of the Central Veterinary Society in Paris and called the disease infectious bronchopneumonia of American cattle and concluded that it was a disease peculiar to America, and known in our Western States as cornstalk disease. Great Britain was considerably exercised over this disease, which they had observed

in American shipments from 1879 to 1891. Their scientific men differed in opinion. Some considered it contagious pleuropneumonia. As a result the embargo was held against American cattle.

Our older veterinarians who had been engaged in eradicating contagious pleuropneumonia from this country know well the similarity the contagious form bears to the pneumonic form of hemorrhagic septicemia. Contagious pleuropneumonia is one of the four principal animal plagues that led up to founding the first veterinary school. A great deal of work has been done on this disease, but the causative organism has never been found. We sometimes wonder if the disease would be promptly recognized if an outbreak should again occur in America. Pleuropneumonia is present in each disease, and on section the lungs show the peculiar marbled appearance. Law calls attention to the fact that a pneumonic bovine lung shows a marbled appearance whatever the cause may have been. It should be remembered that North America is considered free from contagious pleuropneumonia. The pneumonic form of hemorrhagic septicemia is common. Contagious pleuropneumonia spreads from herd to herd, while the hemorrhagic septicemic form is not so characterized. Contagious pleuropneumonia spreads slowly but surely through a herd.

The hemorrhagic septicemic form may attack a number of animals in a herd about the same time and the course is usually much shorter. The lung lesions in the contagious form are characterized by pneumonic areas of different ages. The laboratory can find the bipolar bacillus in hemorrhagic septicemia, yet it may be present in cases of contagious pleuropneumonia. Diagnostic inoculations and history should settle the question beyond dispute.

Aside from the hemorrhagic septicemic form, pneumonia is rather rare in cattle. They appear to be more resistant than horses to pneumonia.

The local veterinarian should be able to recognize the various forms of bipolar infection early and at the same time keep in mind the importance of a differential diagnosis. Diseases with which hemorrhagic septicemia may be confused are anthrax, blackleg, malignant edema, poisons, contagious pleuropneumonia,

rinderpest, malignant catarrhal fever and a subcutaneous tuberculin reaction.

In applying the tuberculin test to cattle in transit or to those that have been recently shipped, it should be remembered that certain cases may develop high temperatures from this infection about the time a reaction is due, and caution must be exercised to prevent mistaking it for a tuberculin reaction.

The treatment for hemorrhagic septicemia is usually unsatisfactory. Death occurs so quickly in the subacute forms that there is no time for medicine to assist in checking its progress. Isolation of the sick, segregation and change of food and water for the exposed are important measures. The disease is reportable under the laws of Pennsylvania, but should not be reported as contagious pleuropneumonia.

The pectoral form seems less malignant, and treatment should be undertaken promptly. There is no specific treatment for pneumonia of any form, yet good nursing and certain drugs judiciously used are of inestimable value.

The pneumonic form or shipping fever in cattle is amenable to treatment and should be handled along somewhat the same lines that have been so well established for treating influenza and pneumonia in horses.

There is a wide difference of opinion regarding the use of counter irritants. The writer is decidedly partial to a good mustard plaster in the early stages of pneumonia of any form in any species of animals. The action of mild laxatives in certain cases and heart stimulants for all are decidedly helpful.

Much work has been done in an effort to produce a biological product for preventing and treating the disease. Opinions vary regarding their value. They have been used energetically in an effort to control chicken cholera. Results have been disappointing. Their value in controlling calf pneumonia has not been established beyond a shadow of doubt. We are satisfied that preventive measures in the way of good stable hygiene are more effective. The Pennsylvania Bureau of Animal Industry began the use of bacteriological products in bovine hemorrhagic septicemia in 1902. Bacterins were used at first with unsatisfactory results. In 1914 Drs. J. B. Hardenbergh and Fred Boerner prepared a vaccine which was used extensively during the year 1915. Their work was reported in April, 1916, in the JOURNAL

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. The vaccine has been used in Pennsylvania extensively since 1915. In herds or sections of the State where the disease has been known to recur frequently the vaccine is used annually, about as regularly as anthrax and blackleg vaccines. We believe that hemorrhagic septicemia vaccine is useful in preventing and treating the disease in cattle.

DISCUSSION

The subject was thoroughly discussed by Drs. Bernard, Bender, Brady, Chodos, Clark, Johnson, and others who have had many years' experience in handling stockyards pneumonia and other types of hemorrhagic septicemia in Lancaster County. The Lancaster Stock Yards is one of the largest distributing centers for feeding and dairy cattle in the State or in the East. Stockyards pneumonia from this source causes extensive losses each year in this section. The local veterinarians, and especially Dr. Joseph Johnson, have had an extensive experience in handling the disease. All spoke in the highest terms of the value of vaccines in controlling the disease.

DOCTOR HADWEN SAILS FOR ENGLAND

Dr. Seymour Hadwen, who has just completed an 18 months' study of reindeer in Alaska as chief veterinarian and parasitologist of the Biological Survey of the United States Department of Agriculture, sailed for England April 16 to continue his studies. Prior to his work in the Biological Survey, Doctor Hadwen was chief pathologist of the Canadian Department of Agriculture.

Doctor Hadwen and L. J. Palmer have been in Washington collaborating on a report which summarizes the results of their Alaskan studies. Mr. Palmer, who has just returned to Alaska, is in charge of grazing investigation in the Territory. It is hoped that their report may soon be available as a contribution of the Biological Survey to the department bulletin series.

Reindeer herds in Alaska are being encouraged both for their economic value as meat producers for the export trade and for their importance to the Eskimos for food and clothing. Many of the animals from which the Eskimo formerly obtained his food and clothing have been destroyed, and the future of the reindeer, as in any other important industry, depends upon wise supervision and management.

TREATMENT OF RETAINED PLACENTA IN COWS[1]

By GEORGE W. GRIM
Princeton, New Jersey

IN PRESENTING a paper on the treatment and care of cows following retention of the fetal membrane it is my desire to call attention first to the great need of a deeper and more comprehensive study, within the profession, of this most difficult subject. Those who have searched the literature with a desire to find a "best method" which could be safely followed on the rank and file of cases that from time to time confront the practitioner have doubtlessly gone out the same door by which they entered. Those who have practiced perhaps the most generally used method of the day, in routine, that of manual removal, irrigation and the insertion of capsules of iodoform as recommended by Williams, surely can report a great variation in results, and for any of us to attempt to draw satisfactory or substantial conclusions from the scant morsels of information recorded in literature thus far, as a result of clinical observation, would be folly indeed.

It is not my intention to introduce any new method of procedure, but rather to report quite briefly the results obtained in treating 107 cases of retained placenta in a large herd of dairy cattle. During the two years prior to the commencement of the work reported in this paper approximately 316 fetal membranes were retained in cows of this herd. During the same period of time 148 abortions occurred. In most cases the membranes were allowed to putrefy and slough and finally to be discharged by the contractions of the uterus. In many instances weights were tied to the protruding portion of the membranes or the protruding portion was wound about a stick and torn away by direct traction. Very rarely was an animal treated by a veterinarian. One hundred and eighty-six of these cows were sold to the butcher during the first six months following parturition.

The results of this primitive practice upon grade dairy cattle were not as disastrous from the standpoint of loss of life as would

[1] Presented at the conference of veterinarians held at the School of Veterinary Medicine, University of Pennsylvania, February 28 and March 1, 1922.

be expected. The occurrence of septic metritis with peritonitis and death following retention of the membranes was rare indeed. This fact has long been known among cattle men, and were it not for the almost certain sterility that they have recently learned follows in the wake of such treatment, many probably would be satisfied to allow nature to take her course.

So it was that of the 316 cows in this herd which had retained the afterbirth during the two-year period under consideration approximately 130 remained in the herd at the time I was called upon to determine the cause of a prevailing and steadily increasing wave of sterility. A careful physical examination was made of the generative organs of all animals failing to conceive following repeated service. This examination revealed 77 cases of catarrhal metritis accompanied with sterility and 41 cases of sterility in which no evidence of catarrhal metritis could be detected, a total of 118 cases of sterility, all of which were held under treatment. It was not possible for me to identify all of the 118 cases with a corresponding number of the 130 cases before mentioned, but it is very fair to assume at least that within the 77 cases of catarrhal metritis rests a substantial majority of the 130 apparently recovered cases of retained afterbirth present in the herd when this work was started. Hence it appears at once that the amazingly high sterility rate in the herd at this time can be attributed directly to the absence of treatment of the uterus at the time of retention of the fetal membranes. It is also worthy of note at this time that of the 316 cases untreated during the two-year period only 7 terminated in death.

With these facts in mind, attention was naturally directed toward the cow at the time of parturition, and a careful watch was kept on all cows immediately following parturition to prevent any animal retaining any portion of the fetal membranes to be passed by unnoticed. Wherever possible the placenta was taken from the stall immediately following expulsion and examined to ascertain if any part had remained within the uterus. The placenta was next carefully examined for lesions of contagious abortion. I regard this examination highly important and can commend it as a valuable adjunct in the control of placentitis and the ravages of infectious abortion. Often, too often, is a badly diseased membrane regarded as normal

when no regular examination is made. The disease, unrecognized, is often unconsciously scattered about, and the discharges containing enormous quantities of infectious material menace all animals with which they come in contact. A good practice to follow in maternity barns is to collect all placentæ in a galvanized iron can as soon as they are dropped and dispose of them by burning. These fetal envelopes that so often are diseased and passed by unnoticed give forth the seeds that propagate the infection in all susceptible individuals with which they come in contact. Cows that were found to pass placentæ of a diseased character, cows that retained the afterbirth and cows aborting were isolated until all discharges ceased. In this manner the opportunity of spreading infection was greatly reduced. If unable to find the placenta the day following parturition, the vulva is examined carefully by spreading the lips apart with the fingers. The appearance of an amber-colored translucent mucus convinces me that the placenta has passed completely and that no further complications are to be expected. In fact, I have never known a cow in which a translucent, amber-colored mucus appeared the day following parturition to have any further uterine disturbance.

In the conduct of this work all animals failing to expel the membranes within twelve hours were considered as suspicious of infection with contagious abortion and treated as such. These animals were immediately isolated and quarantined.

In all cases where the hand was introduced into the uterus the tail, anus, vulva and buttocks were thoroughly scrubbed with a 4 per cent solution of creolin. Immediately before the hand is introduced into the vagina the hand and the arm up to the shoulder are carefully scrubbed and the finger nails are clipped and cleaned. The hand is then carefully passed into the vulva above the protruding membrane, avoiding the latter as much as possible so that infection is not unnecessarily carried into the uterus through contact of the arm with the membrane. The arm is then passed on through the vagina and os uteri into the uterus, and as far back into the cavity as possible. The hand may then grasp the placenta within the uterus, and by slight tension on the membrane with the other hand outside, the extent and location of the adherent portion of the membrane may be quickly determined. By stripping the placenta from a few

of the cotyledons, the degree of adhesion may be ascertained and from this information a decision may be made as to the proper time to remove the membrane.

I do not want to pass on without again laying particular emphasis upon the importance of cleaning up the region about the vulva and cleaning the hands and arms, and of exercising care in entering the uterus, for it is my sincere conviction that upon these things will depend in a large measure the results attained. It has been repeatedly shown that where grave constitutional disturbances with metritis and peritonitis develop the infecting organism is quite frequently carried directly to the uterus from without and there it multiplies with great rapidity. Is it not then reasonable to infer that the hands and arms of the operator are one of the greatest dangers for the introduction of these microbes? Certainly it appears so when we stop to consider how rarely indeed death occurs following neglect to remove retained membranes.

The ideal to be sought for in the removal of the retained membranes by hand is to take them away at the earliest time when the separation of the chorionic adhesions to the maternal cotyledons may be made readily and completely and with the least disturbance to the patient. When this operation requires more than 40 minutes the patient often becomes uneasy, straining occasionally, and plainly showing evidence of fatigue. To insure the best results this must be avoided. In cases where spasmodic uterine contractions commence during prolonged cleaning I have found it best to stop work at once. This necessitates a second operation, usually the following day, to remove the membranes completely, and hence the danger of introducing infection from without is increased. I do, however, believe that when care in cleaning up is exercised the danger of introducing infection by entering the uterus a second time is of less consideration than the distress inflicted upon the patient by prolonged cleaning. Rarely are there observed any bad effects upon the patient during the first 30 minutes of operation. The hand and arm once inserted into the uterus are kept there, if possible, and are not withdrawn until the membrane is out or the operation is suspended until a later date. The object of keeping the hand in the uterine cavity until the membrane is completely released is to eliminate as far as possible opportunity of intro-

ducing infection from without by repeated passage of the hand and arm into and out of the uterus.

The completeness with which the membranes may be removed will depend in a large measure upon the extent of the lesions present. It has been pointed out that in abortion disease the Bang bacillus is present in great numbers in the epithelial cells covering the chorion. The chorionic epithelial cells in the area between the cotyledons are most frequently infected. The epithelial cells at the margin of the cotyledons and the outermost villi of the cotyledons themselves have been found to be densely invaded with bacilli. The bulk of the villi are comparatively free of the bacilli but have undergone profound changes.

What other tissues of the fetal membranes are attacked as the disease progresses is not known. But in a number of cases contained in this report the extent of cell necrosis was such that the chorion tore away from the margin of the maternal cotyledons around the chorionic tufts, even with the most careful handling, 36 hours following parturition.

In cases such as these complete removal is impossible. Investigation has shown that a very large percentage of retained afterbirth is associated with infectious abortion. No doubt other diseases of the membrane will be identified to account for placentitis not associated with Bang's bacillus. But the fact remains that the fetal placenta is the active seat of the disease until it is expelled from the uterus, and upon the extent and progress of infection will depend the alterations in the placenta and the condition we are called upon to treat. It is hence quite obvious that no definite time may be set following abortion or parturition when placentæ may be removed if best results are to be obtained.

The methods of treatment studied during the course of this work were the following:

1. Manual removal third or fourth day.
2. Manual removal third or fourth day and lactic acid bacilli and dried milk powder introduced into the uterus.
3. Membranes not removed; lactic acid bacilli and dried milk powder introduced into the uterus.
4. Lactic acid milk in conjunction with mineral oil.
5. Mineral oil and lactic acid bacilli.
6. Manual removal 24 hours following parturition.

The accompanying table summarizes the results obtained by these six methods of treatment.

SUMMARY OF RESULTS OF 107 CASES OF RETAINED PLACENTAE

Treatment	Number of cases	Recovered. No further treatment	Discharge persisted 3 months	Sterile from other causes	Average number of days required to clear up
Manual removal third or fourth day	29	21	5	3	12
Manual removal third or fourth day and lactic acid treatment	23	6	4	13	8
Membrane not removed; lactic acid treatment	11	3	3	5	15
Lactic acid milk and mineral oil	2	0	2	0	.....
Lactic acid bacilli and mineral oil	16	6	7	3	10
Manual removal in 24 hours	26	22	4	0	7

Of the 29 cases removed by hand upon the third or fourth day, 21 required no further treatment after the twelfth day following parturition. Periodic examinations of the condition of the uterus were carried out in all cases until a positive diagnosis of pregnancy could be made. It will be noted that 8 of the 29 cases treated by this method resulted in sterility. In 5 of the 8 cases the sterility was apparently due to catarrhal metritis. The sterility in the other 3 cases was apparently of ovarian origin.

The normal course of a case terminating in recovery following this method of treatment is as follows:

Ayrshire cow, age 6 years. Aborted at first pregnancy. Carried calf full time at three succeeding pregnancies. Retained placenta at fourth parturition; calf normal.

First day—Placenta retained and protruding from vulva; grayish-yellow discharge.

Second day—Portion of membrane still protruding from vulva; condition of patient good.

Third day—Membrane still retained; condition of patient unchanged.

Fourth day—Placenta removed by hand. Abundant discharge; odor pronounced.

Fifth day—Some odor and watery, gray discharge noted.

Sixth day—Odor still persistent; discharge becoming dark and not so thin.

Eighth day—Discharge much reduced in quantity and becoming thick, sticky and brownish black.

Ninth day—Discharge and odor slight. Condition of patient good. Lactation good.

Eleventh day—No discharge or odor detected.

On the twenty-fourth day following parturition a vaginal examination was made and the cervix was found to be tightly contracted. A scant quantity of clear mucus was found to be present in the vagina. Rectal examination showed the uterus to be contracted down to normal and no abnormalities of the tubes or ovaries were detected. At the third œstral period following parturition the cow was bred. On examination ten weeks later the animal was found to be pregnant.

While fairly uniform and fairly satisfactory results were obtained by manual removal on the third or fourth day, difficulty was quite often encountered in getting the uterus to clean up to a sufficient extent to permit the cow to be placed in the milking herd on the eighth day following parturition. As it was desired to have a fresh cow fit for the production of milk when the seven-day period specified by the certified milk regulations expired, an effort was made to devise a method of treatment that would hasten recovery in these cases. With the view of inhibiting bacterial action in the uterus following manual removal of the membranes and thus hastening recovery, a half-teaspoonful of a pure culture of lactic acid bacilli grown in sterilized milk was placed in a gelatin capsule with two or three teaspoonfuls of dried milk powder. One of these capsules was inserted in the uterus after the removal of the membranes, and this was repeated every second day until the os closed. The capsules were also used without manual removal and also in conjunction with mineral oil, and in two cases lactic acid milk was used with mineral oil. The use of the lactic acid bacilli in these cases was based upon the lactic acid therapy advocated by Metchnikoff in the use of fermented milk drinks in the treatment of intestinal disturbances in man. Dried milk powder was added to the lactic acid culture so that the lactic acid bacilli would find a ready soil upon which to grow. Under favorable conditions the lactic acid bacillus grows very rapidly and produces acid. The growth of other bacteria is inhibited when the acidity reaches 0.2 per cent, but the lactic acid bacilli continue to grow until the acidity reaches 0.8 per cent. The benefit, there-

fore, to be derived from the use of these cultures depends upon their ability to produce acid in sufficient quantity to keep down the growth of other organisms. If this can be done successfully, the number of cases in which the discharge is prolonged beyond a week are materially reduced.

Twenty-three cases, as shown in the table, were treated by manual removal of the membranes during the third or fourth day and in addition a capsule containing lactic acid bacilli was inserted into the uterus. A capsule was placed in the uterus every other day as long as the cervical canal would permit of the introduction. In most of the cases the discharge ceased after the insertion of two or three capsules. When the discharge had considerable odor, both the odor and the discharge were promptly reduced. The number of cases treated by this method which afterwards required further treatment for sterility is disappointing. Further study of a larger number of cases treated by this method will be required to determine what part the lactic acid bacilli and powdered milk play, if any, in increasing the number of nonbreeders. Cases of chronic catarrhal metritis were quite rare following this treatment. In most of these cases the prevailing sterility was found to be associated with pathological conditions of the ovaries. Giltner and Hallman report the use of *Bacterium bulgaricus* in a large number of cases of purulent metritis, with favorable results. No mention of the subsequent occurrence of sterility is made.

The lactic acid capsules were used in most cases on cows in which the placentitis had become so extensive that the diseased chorion had separated from the fetal cotyledons at the outer margin, the chorionic tufts in many instances being so firmly adherent to the maternal cotyledons that it was impossible to free them. In such cases a discharge was quite frequently observed following manual removal of the membranes upon the third or fourth day which persisted in varying degrees for two or three weeks after parturition. The early use of lactic acid capsules in these cases promptly and efficiently controlled this discharge, and in many cases no discharge was observed after the eighth day following parturition.

The following typical case illustrates the effectiveness of the lactic acid bacilli in controlling the uterine discharges:

Large Holstein cow. Gave birth to normal full-time calf at first pregnancy.

Uterine examination on second day showed placenta firmly adherent. Considerable odor was present. Two capsules containing lactic acid bacilli and dried milk powder were inserted in the uterus.

Third day—Placenta still retained; odor pronounced. One capsule inserted.

Fourth day—Placenta still hanging from vagina. Removed by hand. Two capsules inserted. Thick grayish yellow discharge present; some odor.

Fifth day—Discharge greatly reduced in quantity; odor faint.

Seventh day—Discharge very scant and becoming thick, yellow and sticky; no odor; uterus contracted.

Eighth day—Tuft of hair on vulva clean. No discharge noted.

Tenth day—No odor or discharge present.

Subsequently this animal was bred three times and failed to conceive. On examination the uterus appeared normal in size. No evidence of endometritis. The right ovary was enlarged and a cyst was found upon its surface and ruptured. The animal was again bred and is now pregnant.

In order to determine to what extent lactic acid bacilli would control putrefaction and prevent the development of chronic catarrhal metritis, the retained membranes were permitted to remain in 11 cows, no effort being made to dislodge them. Capsules containing lactic acid bacilli and dried milk powder were introduced into the uterus every other day to check putrefaction. The results as shown in the table seem to indicate that while the incidence of chronic catarrhal metritis was not so high as in the cases untreated, the number of nonbreeders was certainly too high to justify the use of this method. The discharge also persisted for a longer time than with any of the other methods of treatment used.

In connection with the investigation of the action of lactic acid bacilli an effort was made to determine whether commercial lactic milk, as prepared for the market, could be successfully utilized in the control of discharges associated with retention of the fetal membranes. Ordinary commercial lactic acid milk with an acidity of 2 per cent was used. Both *Bacterium bulgaricus* and *Bacterium lactis acidi* were present in the milk. One quart was injected into the uterus of each of two cows into which mineral oil had previously been injected to free the retained membranes. The results, stated briefly in the table, are given in more detail below:

Two cows gave birth to normal calves; the fetal membranes were retained in each instance. Mineral oil was injected into the uterus of both cows upon the first day. In one case the

placenta was passed within 24 hours and in the other it was retained until the fourth day, when it was removed by hand. In this case the cotyledons in the gravid portion of the uterus were considerably swollen and the adhesions between them and the fetal tufts were very firm. A considerable quantity of fluid was present, some of which was removed by massage of the uterus. On the fifth day a quart of lactic acid milk was injected into the uterus of each cow. The following day the discharge was reduced in quantity, and the cervix in one case was so much contracted that considerable difficulty was experienced in passing a one-half inch catheter. In the other case some evidence of contraction was noted. Lactic acid milk was again injected into the uterus on the sixth day. On the seventh day the discharge was unchanged and both cows were straining. The mucous membrane at the entrance to the uterus was slightly rough and dry. On the eighth day both cows were straining badly and the appetite was poor. The discharge was diminished in quantity and the odor slight. Both of these cows continued to strain until the twelfth day, at which time one of them ceased to strain and showed signs of improvement. On the fourteenth day straining subsided in the other cow. Both animals were in poor condition by this time and were sold as unprofitable.

Along with the study of the action of the lactic acid bacilli with and without the manual removal of the fetal membranes, observations were also made on the effect of the injection of mineral oil the day following parturition in sixteen cases. From one-half to one and one-half quarts of mineral oil were introduced into the uterus by gravity in cases in which the membranes had not been passed twelve hours after parturition. In ten cases it was necessary to repeat the injection of the mineral oil the following day. Seven of these cases did not pass the membrane after repeated use of mineral oil, and it became necessary to remove the membrane by hand on the fourth day. Quite often putrefaction had advanced to such a degree by this time that lactic acid capsules were used to decrease the discharge and control the odor. The table shows the results following this treatment. I consider the number of cases in which the discharge persisted over two or three weeks too great to continue further application of this method. In some

instances a uterine examination made after the placenta had apparently been discharged revealed the presence of small portions of placental tissue still firmly adherent to the maternal cotyledons. These probably accounted for the persistence of the discharge.

Finally, 26 retained placentæ were removed by hand 24 to 36 hours following parturition. The finger nails, hands and arms were thoroughly scrubbed before entering the uterus. Great care was used in separating the placental adhesions to avoid leaving any portion of the membranes within the uterus. In almost every case from 30 to 45 minutes was required to remove the membranes completely. This work was very tedious. It was not possible to remove the retained membranes in every case within 24 to 36 hours following parturition, and in such cases they were allowed to remain until the third or fourth day. It was, however, possible to remove the membranes within 36 hours in 26 out of 35 cases in which the attempt was made. As shown in the table, the number of complete recoveries is quite encouraging. The average time required for these cases to clear up is also shorter than in any other method studied. Absolutely no after treatment was given any of these cases. They were left entirely alone and observations made upon the quantity of the discharge and the degree of odor. No disinfectants or solutions of any kind were used, except in four cases in which the discharge persisted. These were treated with Lugol's solution some time later.

It may be noted that in no place in this paper is any mention made of the use of uterine antiseptic douches following the removal of the placenta. Antiseptic douches were not used because of the opinion often expressed that antiseptics generally reduce the normal resisting power of the mucosa, and also because it would seem that the effect of antiseptic solutions can not be very pronounced in the dilutions in which they must be used in the uterus.

STERILITY OF CATTLE [1]

By E. C. DEUBLER
Ardrossan Farms, Ithan, Pennsylvania, and
M. F BARNES
Pennsylvania Bureau of Animal Industry, Harrisburg, Pennsylvania

STERILITY may be defined as an absence of the normal generative functions, either in part or as a whole. It may be due to lack of development of the organs of reproduction, some part or parts of them, or to a suspension of their normal functions.

The class of cows in which sterility is due to a lack of development of the generative organs is usually observed when the cow has arrived at the age for her first conception. This class remains permanently sterile. A female born twin to a male usually belongs to this class, although we know of three females born in this manner in which the generative organs became normally developed and when they reached the age of sexual maturity were fertile.

The group of sterile cases in which the generative functions have once been normally active and then for some reason or other become suspended, may be divided into two sub-groups: (1) Temporarily sterile; (2) permanently sterile. Temporarily sterile cows may, by improper treatment or by lack of treatment, become permanently sterile. On the other hand, animals which in many cases without treatment would very likely become permanently sterile may with proper treatment be reduced to the temporarily sterile class.

Quite a number of the temporarily sterile group become nymphomaniacs as indicated by constant "bulling." They often show only false signs of estrum. On examination the ovaries are found cystic and there is generally a cervicitis. Nymphomaniac cases, after repeated treatments of the ovaries by massage and reduction of the cysts over a considerable period of time, eventually become quiet and either show no signs of

[1] Presented at the thirty-ninth annual convention of the Pennsylvania State Veterinary Medical Association, Harrisburg, Pa., January 24 and 25, 1922.

estrum or show signs of normal estrum and if bred conceive. Some heifers become nymphomaniacs.

There are other cases that show no signs of estrum for long periods but in which upon careful examination nothing abnormal can be found, and still others in which a persistent corpus luteum and nothing else can be found, and in some of these the corpus luteum can not be dislodged.

For cases of the nature of those described above we have tried to bring on an estrum and establish the normal estral cycle by the administration of ovaries or ovarian extract, and with apparently good results. We tried the commercial ovarian extract on some cases and it did not seem to bring about the desired results. We then obtained some fresh ovaries from apparently healthy sows, chopped them into small pieces, and gave each case about two ovaries in a capsule by the mouth. This treatment seemed to accomplish the desired end. We then used a specially prepared sterile extract, giving each cow the sterile extract of one to two ovaries subcutaneously, with apparently as good results. The latter method is more convenient and insures against the transmission of disease.

This form of treatment has been given by us to nineteen cases of the nature of those described above, and every case, with the exception of one which is reported below, developed signs of estrum within thirty days. The following cases are representative:

Case No. 1 was born in 1913, gave birth to her last normal calf in 1918; aborted in 1919; was bred to be due March 21, 1920; examined March 17, 1920, and found not pregnant; examined June 10, 1920, and uterus found hanging well over the brim of the pelvis; examined July 7, 1920, and uterus appeared normal; examined July 1, 1920, and found corpus luteum in right ovary which could not be pressed out; examined August 14, 1920, and could not pass a small catheter; examined December 16, 1920, and could not pass catheter; given two chopped ovaries by mouth December 16, 1920; showed signs of estrum on December 18, 1920, which was the first observed estrum since June, 1919. December 28, 1920, she was examined, the catheter was passed, and the uterus was washed out; the return flow was clean. Everything appeared normal. In 21 days (January 8, 1921) the cow appeared in estrum and was bred;

examined March 12, 1921; not pregnant; examined June 3, 1921, and showed slight vaginitis. There had been no signs of estrum since January 8, 1921. The cow has not been examined since June 3, 1921.

Case No. 2 has not shown signs of estrum for 16 months; left ovary large and hard; nothing else abnormal could be found; had been treated with no favorable results; given two chopped ovaries in capsule by mouth; estrum appeared in 18 days; estrum again in 21 days; cow was bred and returned to the herd. The owner, not knowing that she had been bred, kept her in the herd for three months, during which time she showed no signs of estrum, and thinking she was in the same condition, sent her to the butcher. There was no autopsy. The cow may have been pregnant.

Case No. 3 was treated several times for a period of 12 months after freshening, then did not show signs of estrum for a period of four months. At the end of this period she was given chopped ovaries by the mouth; in 20 days showed signs of estrum, was bred, conceived to the first service and calved normally.

Case No. 4 was examined six months after freshening and nothing abnormal could be found; had shown no signs of estrum during period; was given two chopped ovaries by the mouth. Estrum appeared in 18 days. The cow was bred, conceived to first service and calved normally.

Case No. 5 was born October 10, 1910; gave birth to a normal calf in 1913 and another in 1914; aborted in 1915; calved normally in 1916, 1917, and November 11, 1918, which was her last calf; bred May 23, 1919; June 20, 1919; July 10, 1919; August 2, 1919; August 30, 1919; September 26, 1919; October 6, 1919; November 10, 1919; January 8, 1920; January 30, 1920; March 11, 1920; March 31, 1920; April 19, 1920; May 9, 1920; May 28, 1920; June 18, 1920; July 10, 1920; July 30, 1920; August 21, 1920; September 10, 1920; October 4, 1920; November 19, 1920; January 30, 1921; March 16, 1921; then showed no signs of estrum. May 26, 1921, given ovarian extract subcutaneously; showed signs of estrum June 26, 1921, and bred; showed no more signs of estrum; nothing abnormal could be found at any time; died of impaction during fall of 1921.

Case No. 6 was born December 22, 1915; calved in 1918 and again November 12, 1919, which was her last calf; bred April

8 and June 7, 1920; showed no more signs of estrum and thought to be carrying a calf until January 30, 1921, when she was examined and found not with calf. On this date a corpus luteum was dislodged from one of the ovaries. She showed signs of estrum February 2, 1921; was bred; showed no more signs of estrum and was thought pregnant until examination revealed that she was not. May 26, 1921, was given ovarian extract subcutaneously; estrum appeared June 27, 1921, and the cow was bred. Estrum July 17, 1921, and bred again; no more signs of estrum; examined October 20, 1921; not in calf and nothing abnormal could be found; examined November 22, 1921, and appeared normal; given extract of two ovaries subcutaneously November 22, 1921; December 5, 1921, estrum, and bred, then no more signs of estrum; examined January 16, 1922, and was thought to be pregnant.

Case No. 7 was born December 15, 1913; calved 1916, 1918 and last May 7, 1919; bred August 30 and November 12, 1919, then showed no more signs of estrum until July 28, 1920, when she was bred. After this date she became nymphomaniac. She was turned in pasture with a bull during the summer of 1921; would not allow the bull to serve other cows and would not stand for service herself. August 27, 1921, was given extract equivalent to two ovaries subcutaneously, after which she quieted considerably but showed no signs of normal estrum. One or the other ovary had been hard and cystic during all this time; the cysts were hard to break down and often could not be broken down. November 22, 1921, given extract of two ovaries subcutaneously; developed no signs of estrum but has been quiet. Examined January 16, 1922; one ovary apparently normal, the other large and contained cysts which were very easily ruptured; given extract one ovary subcutaneously.

Case No. 8 gave birth to her last calf July 30, 1919; became a very bad nymphomaniac in about six months after calving; treated periodically by massage of ovaries; bred May 5, 1920, and July 28, 1921; quieted considerably after last service and not treated since then. December 12, 1921, was given extract of two ovaries subcutaneously and the next day showed signs of estrum; was not bred and has shown no true signs of estrum since. January 1, 1922, showed false signs of estrum—about half estrum.

Case No. 9 gave birth to her last calf October 28, 1918. She showed no signs of estrum until June 27, 1919, when she was bred; then she became nymphomaniac and was bred repeatedly until a service of November 4, 1920, after which she no longer showed signs of estrum. The ovaries were treated regularly until that date. December 12, 1921, she was given the extract of one ovary subcutaneously; showed signs of estrum and was bred on December 23, 1921, and again January 12, 1922.

Case No. 10 gave birth to her last calf on July 9, 1919, and became nymphomaniac very soon after calving; was treated periodically by massage of ovaries; was bred September 10, 1920, then became quiet and showed no more signs of estrum. December 12, 1921, she was given subcutaneously ovarian extract equivalent to that of one ovary; showed signs of estrum and was bred January 6, 1922.

UNILATERAL SALPINGITIS

Case No. 11 had not given birth to a calf for a period of more than one year; showed false signs of estrum but would not stand for service; examined May 16, 1921, and everything appeared normal, except the right ovary and Fallopian tube, which appeared enlarged. On the same date an operation was performed through the right flank. The right ovary, which was enlarged to the size of a walnut, and the right Fallopian tube, which was about twice the size of a lead pencil, were removed. The uterus appeared normal. The left ovary was small. Upon examination after removal the right tube showed hydrosalpingitis. The right ovary contained, besides several small cysts, a deeply seated corpus luteum measuring five-eighths by seven-eighths inch in diameter and was surrounded by a ring of rather firm fibrous tissue. In one month the cow showed signs of normal estrum and was bred and is over seven months pregnant at the present time.

The French National Students' Union in its tenth congress at the University of Montpellier adopted a resolution urging that the government veterinary schools create and confer the degree of doctor in veterinary medicine to conform to the doctor's degree given in other countries. At present French veterinary graduates are not given the degree of doctor.

EXPERIENCE IN PRACTICE WITH UDDER TROUBLES [1]

By JOHN P. TURNER
Washington, D. C.

AN EXPERT on sanitary milk production once remarked that as long as a cow's udder was located so closely to her main excretory parts, the production of such milk would always entail considerable labor. Likewise, since the peculiar construction of a cow's udder permits of such marked changes when reacting to irritants, mostly bacterial, the successful treatment of mastitis seems to be a problem yet unsolved.

The inflammation occurring in the parenchyma causes the milk ducts and acini to become clogged with an exudate which we are powerless to remove to any great extent and almost as powerless to reach the affected part with any medicinal agencies. When we further consider that a powerful, very slightly yielding capsule covers the udder, and how this quality prevents, to a great extent, the proper circulation of blood and lymph in an udder reacting to irritants, it is readily seen how easily such tissues are destroyed and how little hope there is for recovery in many cases of mastitis. When its anatomical formation is noted, considering also the fact that most of our inflammatory conditions arise at or just after parturition, when the udder is enormously enlarged and extremely active, it is readily seen that such a gland offers a fertile field for bacterial infection.

We know that the normal udder contains an abundant bacterial flora, and that they may assume a pathogenic character under direct irritation. With the progress of knowledge, and especially of bacteriology, it is generally conceded that bacteria play the all-important cause in mastitis. Many years ago it was thought that heavy protein feeding, especially with very narrow rations mostly made up of corn meal and cottonseed meal, caused mastitis. Then the cold cement floor, exposure and other such causes were brought forward. It is known that these may be contributory causes by lessening the animal's resistance; especially is it known that cold causes a lowering in

[1] Presented at the Conference of Veterinarians held at the School of Veterinary Medicine, University of Pennsylvania, February 28 and March 1, 1922.

the resistant qualities of tissues; hence a cold, wet cement floor is an accessory cause.

The infection causing mastitis comes most frequently through the opening in the teat duct, and infection is more frequent in the posterior quarters of the udder; hence the danger of permitting a rotting placenta to remain swinging to a cow, when it can be clipped off near the vulva and by vaginal washes kept from putrefying.

Again, a solution of continuity of the tissues of the gland proper is a common cause of infection, as is also injury to the teats. Thirdly, a group of infections reach the udder from other parts of the body. Such infections as tuberculosis, pyemia, streptococcus and staphylococcus are thus accounted for. Mastitis from indigestion is due to an autointoxication from fermented feeds. Occasionally cases of mastitis are directly traceable to septic conditions of the uterus, the writer having such a case under treatment at present. It is needless to say that any attempted treatment of this type of cases must first consist of cleaning up the uterine infection. In this specific case the mastitis commenced several days prior to parturition. When closely studied, mastitis is very much like wound infection.

Other conditions which can be more or less likened to it are bronchitis and bronchopneumonia, only in these conditions it is possible to assist nature in eliminating the plugging up of the alveoli and bronchials by the action of cough.

This line of comparison may also lead to consideration of the general treatment of mastitis, where we probably have as much right to hope for more success in the future treatment of this disease than merely depending on local medication.

The recent high and more or less artificial development of the milk cow, for the purpose of making an altogether unnatural high butterfat record, during the period closely following parturition, has produced a condition familiar to all practicing in dairy districts, that of a tremendous edema of the udder, which is so closely allied to a pathological condition that some have called it a physiological congestion. This purely physiological condition usually resolves very promptly in a few days if the cow is given a slight amount of exercise, is placed in a roomy box stall with plenty of water available and is fed a proper

cooling laxative diet, such as bran, beet pulp and a small amount of linseed meal.

When we read the wonderful cures of this and that medical preparation, or hear some veterinarian extolling his success in curing mastitis, we are prone to smile and think of our own early days in practice when we could readily establish a reputation for working wonders with a purely physiological condition.

But the experienced owner of high producers does not labor under any such delusions. When his cow develops "garget," as he calls it, he is neither interested in the fact that it may be catarrhal or parenchymatous or even gangrenous, but his first solicitude is as to whether or not you can cure his specific case. It takes all the strategy possessed by an experienced practitioner to handle the owner in these cases, and it is good practice to keep your line of retreat wide open before going into action.

Mastitis is a disease which can not be treated successfully while one is attired in a silk shirt and linen trousers. The writer dons rubber apron and boots and starts the treatment and gives the owner an example of what is expected of him. Most of us are apt to begin our treatment with a saline purgative combined with aloin. While many authorities say the action of salines is too slow, just try it with a quart of hot, strong coffee. Coffee certainly hastens the action of salines. Arecolin in one-half grain to one grain doses hypodermically is recommended by many and condemned by others. Eserin one-half grain and pilocarpin one to two grains are probably better. Eserin can be repeated if given in the smaller dose until a decided action is obtained. It is believed that these rapidly acting cathartics are very valuable in acute cases.

The writer is a strong believer in hot fomentations to the udder, which is first stripped thoroughly into a bucket containing plenty of lysol, sheep dip, or any such disinfectant, and such bucket should be constantly in use in these cases. A beet-pulp bag opened out by ripping and then both ends cut and two ends tied together over the loins and the other two ends passed between the hind legs and up on each side of the tail and carried forward, being attached to the ends tied over the loins, is then applied. Holes are cut for the teats to protrude through the sack, and then woolen cloths, preferably strips from a discarded horse blanket, are applied closely to the udder, in-

side of the suspensory sack and very warm water applied for at least two hours. When this is done, wipe the udder dry and massage thoroughly with iodized oil and apply a dry sack with some cotton batting around the udder. Repeat this treatment two or three times in the first 15 hours. Before retiring for the night, apply hot antiphlogistine or anti-itis thickly over the inflamed area, cover with cotton and a dry sack, and in the morning begin again with the hot fomentations, massaging with oil and warm, dry coverings, if the inflammation has not subsided. We bring the hot water to the stable in 10-gallon milk cans, and in this way the water can be kept very warm. Two cans are kept on the kitchen stove or over the dairy heater during the entire process.

Some authorities claim that the udder should be kept at an absolute rest, and attempt such treatments as belladonna applied locally to diminish secretions. We think its action very doubtful.

The action of heat is well understood, and our massage treatment is entirely directed toward exciting increased vascularity with its well-known sequela of increased leucocytosis; hence the matter of the substance used is immaterial, just so it is easily applied. The old well-known turpentine and lard combination has its advocates, but we sometimes get a little too much counter-irritation, hence our use of ordinary cheap petrolatum oil to which has been added a small amount of tincture of iodin.

We always endeavor to get all cases of mastitis in quarantine. Put them in a box stall in the horse stable, or build a box stall in a wagon shed—any place to get them away from the herd, as we know too well the danger of promiscuous milking of mastitis cases in the dairy barns, when floors and gutters become infected and too frequently the infection becomes general in the herd. It is a good practice to disinfect the stall from which a case of mastitis has been removed; the gutter is also disinfected, a practice which should frequently obtain on all well-managed dairy farms.

As to injecting disinfecting solutions into the milk cisterns through the teat, we discontinued such a practice several years ago, in spite of its many advocates. Inasmuch as the disease is far removed from where the disinfectant can reach, it seemed futile to continue such treatment. It may possibly aid some cases of catarrhal mastitis where the exudate becomes so thick

that it is difficult to remove through the teats, but in such cases we would use normal salt solution merely for its mechanical aid in diluting and somewhat breaking down any thickened collection in the sinus. We would not use boric acid solution, as it tends to coagulate both albumen and casein.

All milk stripped from mastitis cases must be destroyed by disinfection and burial.

While we are not yet sure of our position, yet it seems logical to treat these cases by some general treatment. Potassium nitrate has been used from time immemorial on account of its eliminatory action. Urotropin or its cheaper substitute, hexamethylenetetramin, liberates formalin and in this manner disinfects the udder during its elimination.

Dr. J. N. Frost of Cornell University recommends formalin very highly in the treatment of mastitis. He quotes Dr. Louis A. Klein that boric acid given by the mouth appears in the milk in 12 hours. Urotropin appears as formalin in the milk in 24 hours. Dr. Frost has given 6 drams of formalin twice daily in oil for two weeks and failed to see that it produced any ill effects on the cow's general health, either by loss of appetite, constipation or impaction. He has given 1½ ounces at a dose without ill effect. Given in oil, we get the laxative effect, which is beneficial. When 6 drams of formalin was given 3 hours after water and 7 hours after milking, it was found in the milk two hours afterwards, and continued to be present for 48 hours, the largest amount from the eighteenth to the thirtieth hour.

Frost supplements formalin treatment with purgatives and diuretics, as they increase the interchange of blood in the udder and hasten the elimination of waste products from the body The first day one-half ounce of formalin is given in oil, then one dram three times a day, alternating with one ounce of turpentine, all given in oil. Eight days after this treatment no streptococci were found in the milk in a case of mastitis that had thick milk for two weeks and showed pure cultures of streptococcus. We are now using this line of treatment and believe that it is beneficial in many cases.

It has been our experience that severe cases of catarrhal mastitis usually terminate with closure of the milk duct and atrophy of the quarter affected.

We formerly passed up cases of gangrenous mastitis, as they

were usually found decubitus and in a very critical condition. A few years ago, while investigating a typhoid epidemic with a physician, we were hailed by a dairyman and asked to look at a cow that was down and had "garget," as he expressed it—a typical case of gangrenous mastitis, with patient either unable to rise or would not (a cow has a peculiar psychology of her own in this respect). As she looked "in extremis," we passed it up as usual. After getting into the conveyance, I asked this physician how they would handle such a case in human practice. He replied that either amputation would be tried or deep incisions for drainage to assist nature in a process of enucleation. On our return a few bold incisions were made deeply into the mammary gland and a stimulant of 1 grain of strychnia sulphate was given hypodermically. In those days one grain of strychnia sulphate hypodermically was the usual dose for cows. We have now changed it to ½ grain after having a few convulsions. A few doses of stimulant were left with the owner, and much to our surprise the cow got to her feet the next day and later was turned into beef.

A very recent case of gangrenous mastitis involving the left posterior quarter of the udder was deeply incised, and nature made the most perfect job of enucleation we have ever observed. We had always considered the udder an organ of two parts, anatomically, but in this case nature made a perfect dissection of one quarter. The only error she made was in not sloughing off the blood vessels, which protruded as long finger-like cords, which we eventually had to pull down as far as possible, ligate and excise. This cow milked regularly through the other three quarters of her udder during this period of enucleation. Recently we used camphor in oil subcutaneously in these cases as a stimulant.

Those cases of subacute mastitis involving the entire udder, where bloody milk is the principal symptom, have not as a rule yielded favorably to treatment. In these cases we apply cold applications, using a solution of alum.

Localized mastitis with abscess formation is promptly evacuated into a pus pan or bucket containing disinfectant. The cavity is swabbed out with dry cotton, and iodin is later applied to the entire cavity, which is plugged with gauze into which we have worked as much bismuth formic iodide as is

possible. This powder is odorless and used in lieu of iodoform, which is banned on all dairy farms. We plug these cavities to prevent teat or stable infection with pus.

We do not use bacterins in treating mastitis, owing to the multiplicity of organisms found in the average case. Where mastitis has a tendency to involve other animals we would endeavor to have a bacterin prepared from the typical cases on hand.

Since we can cure only a small percentage of mastitis cases (25 to 35 per cent), and its treatment is always uncertain, laborious and frequently unsatisfactory, why not try prevention? Provide clean and well-littered maternity stalls. Give the cows on the milking lines plenty of space to prevent treading on each others' teats and bruising udders. Cut off, near the rectum, all retained placentæ, and keep them from becoming putrid by vaginal washing with normal salt solution. Drain and fill in all filthy barnyards and insanitary water holes to prevent teat infection. Recover and destroy all pus in stables. Make a practice of flushing gutters. Prevent sore teats from further infection by eliminating the sucking calf, and then protect the teat wounds. Where these wounds are so sore as to make milking difficult through attending pain, we wipe the sores with 4 per cent novocain (procain) solution prior to milking. By the time the other three teats, as the case may be, are milked, the sores will be anesthetized and milking can proceed with comfort to the cow and no danger to the attendant. Such a procedure also tends to prevent cows, especially heifers, from becoming confirmed kickers. When teats are sore but still able to be handled, we often dissect off the hard fissure and either apply phenol or touch them with nitrate of silver, to produce a firm protective scab.

A few years ago our dealer's barns were infected with a disease somewhat resembling cowpox, but the characteristic bluish ulcers of the latter were not present, nor were any febrile symptoms noted. The disease was more of a vesicular type of the teats and around the base of the teats. The disease readily answered treatment consisting of a local application of glycerin, tincture of iodin and tincture of benzoin compound in equal parts. In some cases we use glycerin and zinc ointment. With the advent of cement floors and improved stable fittings

and sanitation, this disease seems to have disappeared in our practice.

Infectious mastitis.—We have never seen a true outbreak of this form of mastitis, but were called in consultation to a large dairy farm in Pennsylvania, where a disease very similar to it existed. A mechanical milker was in use and probably had considerable to do with the outbreak, due to imperfect cleaning of its parts.

Enzootic mastitis.—This form has occurred very frequently in our practice during the past 30 years and has been observed twice on one dairy farm. The infection was probably a streptococcus infection, as it was very virulent. On the farm where the disease was twice observed several cows died of the infection, the result of secondary invaders. About one-half of the cows were ruined as dairy cows by the first infection, and the herd was practically ruined by the second infection, which occurred three or four years subsequent to the first outbreak.

We were called as consultant both times and advised isolation, quarantine and a general cleaning and reconstruction of the barn. The barn was finally put in sanitary condition by concreting floors and gutters and putting in modern stanchions and plenty of sunlight. The disease has not reappeared.

The methods on this farm were very primitive, and in both outbreaks mastitis cases were never isolated and the same milkers milked sound and unsound udders.

If we can impress you with the absolute necessity of quarantining all mastitis cases, we will be rewarded for our time. An old shed, the horse stable, a tool house—any place where a cow can be snugly kept for a week or two. Milk her after all other dairy work is done, and then wash the hands with soap and water and some bichloride of mercury solution. Milk this cow into a bucket containing disinfectant and bury the milk.

One of the most frequent conditions we are called upon to treat is partial or total closure of the opening of the milk canal, caused by local inflammation of the end of the teat, due either to hand infection (pinching, sharp finger nails, etc.) or to extension of inflammation from some vesicular or pustular condition of the teat or in other cases to treading on the end of the teat.

In heifers we occasionally see imperforate teats in all four quarters. These cases are treated by using a small cannula and

trocar to open the milk duct, followed by the judicious use of a teat plug.

In mild recent cases of partial closure, due to inflammation, we can relieve the condition by immersing the teats in very warm water for a few minutes prior to milking, causing a relaxation of the circular muscle fibers at the end of the teat. When milking is finished the teat is immersed in iodized oil. When such treatment fails it is necessary either to slit the end of the teat or to ream out the so-called "spider" with a Hug reamer. The latter procedure is usually adopted on farms quite a distance from our office and where any pretense to cleanliness obtains. On the old-fashioned "cow dung" farm we do not attempt teat surgery. The success of any teat operation depends on whether or not a fair degree of cleanliness obtains in the barn, and whether or not the herdsman can be properly drilled into following directions.

Our technique is as follows:

Milk all of the sound udders first, and then the three sound teats of the cow to be treated. Wash the udder and teats thoroughly with white soap and warm water. Dry. Apply tincture of iodin to the end of the teat.

Secure the cow's hocks with a strap, or chain hock hopples, and then have an attendant pinch the nose. Then we wash our hands and introduce the Hug teat reamer, which has been previously kept in a bottle of alcohol and dipped in petrolatum just prior to using. Insert the Hug reamer, going only a short distance from the end of the teat, then open and pull out of the teat; one or possibly two cuts are necessary to open the end of the teat sufficiently wide for easily milking. The teat is now held for two or three minutes in a teacup containing 1-1,000 bichloride of mercury solution. Then we wipe the teat with gasoline to remove all skin fats, and apply a few rolls of electrician's tape around the teat, possibly two thicknesses, and insert a piece of tape which has been doubled on itself and a good-sized hole cut out of it near its end. This piece should protrude almost to the end of the teat. Two or three more rolls of tape are made over this to secure it in place, and then a metal self-retaining loop-end teat plug is inserted into the teat, after it has been immersed in both alcohol and oil. A piece of tape is tied to the plug, and this is tied by a bow-knot to the

extending piece of tape. The cow's tail is loosely secured to a surcingle, or rope, to one side of the animal, and the hock hopples are removed.

The herdsman is advised to milk this cow last and after securing her hocks to wash his hands. A small wide-necked bottle of medicated alcohol and another bottle of petrolatum oil and two or three quarts of 1-1,000 bichloride of mercury solution are left for treating. If the teat is dirty, it is washed with warm water and soap. If not, it is soaked in a small cup of bichloride of mercury solution prior to removing the teat plug. The latter is removed and placed in the alcohol bottle by simply handling it by the tape. The teat is now milked and the end is soaked in a bichloride of mercury solution and the teat plug replaced after immersing it in the oil.

The cow's hocks are to be tied prior to any dressing, otherwise the plug is apt to be kicked out of the herdsman's hands and become infected. He is always advised to follow the procedure heretofore described. If the plug falls or becomes infected, it must be washed with hot water and alkali powder and disinfected with alcohol and immersed in oil prior to replacing.

This plug can be used for a week and then removed and the end of the teat dressed twice daily with zinc ointment.

The same treatment is followed where obstructions exist further toward the base of the teat, but the prognosis becomes more unfavorable as the lesion more nearly approaches the base of the teat.

We have never used the teat cannula described by Dr. Charles B. Conger, Richland, Mich., in *Veterinary Medicine* for April, 1921. We believe one must be within easy distance of the case if it is to be used successfully.

Fibrous obstructions of the teat duct.—Wherever possible we employ the Hug reamer and use the teat plug as heretofore described. However, there are cases of obstruction near the base of the teat which will not respond to this treatment.

Merillat (*Veterinary Journal*, May, 1916) states that Dr. A. M. Wray regularly operated on such fibrous growths by opening the teats over the obstruction; he only feared those obstructions with a fibrous band high up in the galactoforus sinus. He simply used surgical cleanliness and did not suture

the wound. The teat was carefully catheterized daily and the wound wiped and tincture of iodin.

Merillat cites three operations of his own, where nodules were in the teats. One was three-quarters of an inch from the teat orifice and the two others near the base of the teat. The animals were cast and stretched, the udder and teat cleaned and painted with tincture of iodin. A 4 per cent solution of cocain was injected over the seat of the incision. Cut into the teat with one stroke, and the fibrous growth is snipped off with Mayo scissors. An Esmarch tourniquet was kept on the teat for 2 hours and then released. Teat was dusted with iodoform and treated as an open wound. The cases were personally catheterized daily by a veterinarian and the wound treated with tincture of iodin and iodoform. Leakage ceased after ten days.

Dr. Moore (*American Journal of Veterinary Medicine,* February, 1917) treats fresh wounds involving the milk sinus by using a self-retaining milk tube having an opening in the tube just above the retaining bulb. This drains milk which gathers toward the end of the teat. The tube is left in place and removed twice daily and boiled 10 minutes. He dresses the wound with iodoform and collodion and bandages.

In teat fistulas he cuts out a triangular piece above and below the fistula and scarifies it slightly; does not suture the wound, depending on the cicatrizing of the two new wounds to close the fistula.

In stenosis of the teats he casts the cow and slowly inserts a sterile dilator and massages the teat so as to dilate the canal and stretch the tissues without rupturing them. He claims this cures a hard milker.

When the opening in the end of the teat is too small he uses local anesthesia and slowly introduces a tapering sound into the teat canal. This sound may be from five-sixteenths to three-eighths inch at its widest.

In bands at the base of the teat, which prevent the milk from entering the teat from the sinus, Moore pushes a teat slitter through the obstruction and makes the slit as large as possible. Failing in this, he cuts down through the teat and dissects out the fibrous band. In new growths obstructing the canal, he cuts down and removes the growths. Lactic acid calculi are

removed by using the dilator and pushing out with finger and thumb.

Traumatisms of teats involving the milk duct are very frequent in our work. When the wound is but a few hours old it is often possible to suture it and get primary healing. The cow is to be cast and the udder and teats thoroughly cleaned and packed around with clean newspapers or towels during the operation.

I have not been able to get primary union by simply bandaging the teat, as has been described by some writers in recent magazine articles, but these refer to surgical wounds in which the edges can be approximated without suturing.

More frequently than otherwise, the suturing of these teat wounds is attended with a lacteal fistula due to the fact that the teats seem to have some erectile-like power in their musculature, and when the milking process begins the milk suddenly gushes out of the wound as soon as the milker attempts milking the other teats. Our practice is to introduce a milk tube into the teat before touching the sound teats. The tube is immersed first in alcohol and later in petrolatum oil, it being understood that the end of the teat is to be clean and dipped in bichloride of mercury solution prior to introducing the tube. Sometimes this will prevent this gushing of milk through the sutures. As we have remarked before, the healing of these fresh wounds is very uncertain, and more often than usual a fistula results and is to be operated upon when the animal is dry. Always dry the animal if possible from six weeks to two months prior to parturition, in order to get sufficient time for the healing of the new wound.

We use collodium to cover the wound when the sutures are removed.

Supernumerary teats are to be removed from all purebred cows. It is far better to do this when they are young heifers, by stretching the small teat, snipping off with a pair of scissors, and touching the wound with either a piece of nitrate of silver or with the thermo-cautery, or we frequently use a small poker heated in the kitchen stove. Occasionally we snip off the small teat and suture the skin with two or three stitches. If not done until they are grown, the operation should not be attempted if the udder is already beginning to fill. It is recommended that

at least a month should intervene between this operation and freshening.

The same rules are to be observed where small teats are attached to the other teats near their base and are to be removed. Cast and stretch the animal, iodin the teat, stretch the attached teat, and by holding it with the hand snip off with sharp scissors, making the skin wound as small as possible, and touch with a small needle of the thermo-cautery. It is advisable to put a rubber band around the base of the large teat to control the small hemorrhage during the operation. Cut the band in one hour.

Twin teats can be separated if the joining membrane is thin, otherwise it is best to leave them alone.

In any of these teats or udder operations it is essential to have very dry and clean bedding. We frequently cover the straw bedding with plenty of clean newspapers; these can be changed frequently. The tail is to be tied loosely to the side until the patient is well.

Milk cysts following catarrhal mastitis are seen occasionally and are usually left alone. It is preferable to permit the quarter to atrophy than to try any meddlesome surgery. Where a quarter of the udder contains milk and a teat is entirely occluded, atrophy of the quarter generally occurs, if meddlesome, bad surgery does not cause infection.

Warts, both diffuse and pendulous, are very common in our practice. Snipping off pendulous warts and a careful touching of the wound with triglacial acetic acid applied with a little cotton on the end of a match usually produces permanent results. The surrounding skin is protected with vaseline.

Diffuse flat warts yield quite readily to applications of salicylic acid and castor oil.

Milk fistulas of the teat are not treated until the cow is entirely dry. We then cast the animal, using the English hopples, stretch the cow, fastening the hind legs to one post and the fore legs to another. If the cow is horned, we bandage the horns with crimped stiff paper prior to casting. A small amount of 4 per cent novocain (procain) is injected around the fistula after the teat has been thoroughly cleaned and the area iodined. A small syringe used in dog practice, with a small needle, is best in these cases. A milk tube is introduced and the fistulous

opening entirely dissected out with a pair of sharp-pointed scissors. Hemorrhage is controlled, iodin applied, and the wound sutured with fine worm silk, using a small curved needle. If we feel fairly sure of our technique, we apply collodium; if not, a little iodex ointment, and bandage with 1-inch gauze bandage, smearing tar over the latter. Remove stitches in five to seven days.

Some of the small fistulas of the teat will respond to the application of a caustic or by touching them with the small needle of the thermo-cautery, but this type of treatment is not radical and is not done unless the dairy farm is available. Most of our calls are at quite a distance, and the radical operation must be done on the first visit, as the expense frequently precludes a second visit.

In response to an invitation, Dr. B. H. Ransom, Chief of the Zoological Division of the Bureau of Animal Industry, read a paper before the American Medical Association at the meeting to be held in St. Louis, May 22 to 26. His subject will be, "Recent Additions to the Knowledge of Ascariasis."

At the annual meeting of the American Society of Tropical Medicine held in Washington, D. C., May 2 and 3, Dr. M. C. Hall read a paper on "Carbon Tetrachloride as an Anthelmintic."

Dr. R. C. Julien, State Veterinarian of Indiana, spent several days in Washington during the early part of May, visiting Bureau laboratories, also the experiment station, and conferring with Bureau officials on matters relating to the cooperative tuberculosis and hog-cholera work in his State. Dr. Julien also visited the Maryland State Agricultural College at College Park, Maryland.

Dr. T. P. White, Assistant Chief of the Division of Hog Cholera Control, B. A. I., left Washington on April 23 on a trip through the South to confer with Bureau representatives and cooperating State officials on matters in connections with the hog-cholera work.

THE IMPORTANCE OF BACILLUS ABORTUS AS COMPARED WITH THAT OF OTHER INVADERS

By G. E. JORGENSON
Clermont, Iowa

IN the February issue of the A. V. M. A. JOURNAL there appears a splendid article by Dr. E. C. Schroeder, of the Bureau of Animal Industry Experiment Station, describing the meritorious work being done there in the investigation of infectious abortion. Meritorious, not only because of the extensive work being done, but also for the reason that the results have established certain facts. A careful perusal of this paper will convince one that definite results have been accomplished. One thing that I am satisfied with as having been accomplished is the establishment of the status of the *Bacillus abortus* of Bang, as far as its mode of dissemination, its mode of entrance and its normal habitat are concerned. The amount of work done in this connection justifies one in the belief that successful contradiction of these findings is not possible. It also quite clearly reaffirms the pathogenicity of this organism. However, the extent or prevalence of infections in which it is the etiological factor and the successful acquittal or incrimination of other microbian invaders has not, according to the present writer's opinion, been conclusively shown, and this question opens up an avenue for further study and investigation.

There are two factors quite antagonistic to successful progress in the investigation of genital diseases. One is the lack of proper facilities for study of this question by the field worker. The other is the unfortunate existence of two classes of workers, each ultraradical as far as his views and beliefs are concerned. One is the worker who absolutely insists that no etiological factors are worth considering in genital infections except the *Bacillus abortus* of Bang. The other is equally insistent that the Bang organism is entirely ignorable and that genital infections are invariably of other origin, when as a matter of fact if a happy medium, as it were, could be struck something quite definite in the control of this serious insidious malady might be accomplished. A practitioner reads these two diametrically opposite opinions and the net result is confusion and a tendency toward the development of skepticism.

There are absolutely no facts upon which to base the contention that the *Bacillus abortus* is not capable of causing fetal death and expulsion. Neither is there any evidence to show that other organisms are not equally capable of producing the identical results. Furthermore, there has been nothing developed to show to what extent either form of the presumed etiological factors is prevalent.

Some years ago it was taken for granted that the only etiological factor worthy of consideration in swine diseases was the filterable virus of hog cholera. Since its control has been accomplished we find ourselves merely on the threshold of the solving of the etiology of swine diseases, and today we are face to face with a most confusing and chaotic situation as far as the diagnosis of swine diseases is considered. It is in my opinion equally fallacious to assume that *Bacillus abortus* is the only etiological factor worthy of consideration merely on the establishment of its pathogenicity in genital infections.

For a number of years the present writer has been focusing his attention and efforts on the eradication or control of reproductive inefficiencies, and it has been his experience that in several herds where numerous abortions were yearly occurrences the agglutination test failed to give positive results, and it was impossible to demonstrate the *Bacillus abortus* either microscopically or by attempts at culture, due consideration being given to its peculiar physiological characteristics. However, streptococci and organisms identical morphologically and culturally with *Bacillus pyogenes* were demonstrated both in the infected cows and in the offspring or aborted fetuses. It has also been his experience in other instances that the administration of specific antigens both killed and alive gave no results in herds where the agglutination test was negative, but that the results in herds where the test was positive merited further consideration. Yet the herds seen in which *Bacillus abortus* could be demonstrated were relatively few as compared with those in which other invaders could be demonstrated.

Furthermore, in the control of genital anomalies consideration must be given to other factors, inasmuch as the reproductive function is a most complex one. There is not any evidence available to show that the genital system is more resistant to the invasion of pathogenic organisms than the rest of the body,

hence it may be assumed with a fair degree of propriety and certainty that the lesions observed by the writer and others who have worked with genital diseases can have some bearing on the reproductive function. When spermatozoa, which, while alive, yet show clearly the presence of pathological conditions, are seen time after time, and clearly recognizable degenerations in the testicle, vas and seminal vesicles, it would seem that when the progeny of such bulls are aborted in the early stage of embryonic life without the presence of *Bacillus abortus* being demonstrable in spite of careful, painstaking efforts, yet the presence of other invaders is clearly observed, the conclusion that the latter and not *Bacillus abortus* were the actual etiological factors would be most logical.

That such infections do occur would seem to be further strengthened by the statement in Dr. Schroeder's paper in which he mentions a herd in which a series of abortions followed the purchase of a bull. It was shown that *Bacillus abortus* was present in this bull's genitalia. Yet the findings at the station showed conclusively that infection by the genital route of nonpregnant cows was not the rule, and the author assumes that each cow partook of and ingested some of this bull's penile secretion. I will admit that such could be possible, yet to me it appears as highly improbable, and as long as in this case it is a matter of presumption, I should say that this bull harbored some other infection which was able to propagate and cause a disturbance in female genitalia even though it was admitted via the genital route, or that weak and imperfect spermatozoa were the result of weak and nonresistant fetuses being formed.

There is no intention on the part of the present writer to discredit in any way the work being done by Dr. Schroeder and his coworkers. On the other hand, as one who has worked with this condition for years and who has experienced that bitter feeling of utter defeat and inability to cope with a most insidious and (if that word may be used) mysterious anomaly, I am in a position to appreciate the amount of work which must have been done, the laborious, monotonous and nerve-racking repetition of experiments which have been expended in the results so far established as facts. When the writer considers these features he has nothing but praise and admiration for the laudable efforts made by these men under the poorly remunerative con-

ditions of the Bureau and the almost discouraging lack of recognition and proper support by the Nation.

The only motive which the writer advances for the creation of this paper is that, besides a desire to express at least his commendation and appreciation for the work which has been done at this station, he desires to point out emphatically that there are, without a shred of doubt, other etiological factors responsible for infectious abortion besides the *Bacillus abortus*. Such at least is the experience of men who have met and grappled with this disease as it exists in the field, absolutely isolated from the artificial environment of the laboratory. With this expression of his opinion he desires not only to urge these men on to further efforts, but to make the suggestion that careful consideration be given to every feature which may interfere with the procreative function. That of course includes not only a consideration of the direct effect of microbian invaders upon the well-being of the young embryo, but also the effect of such upon the specific genital cells before the phenomenon of fertilization has occurred. He is as sincere in his condemnation of the worker who can see only organisms not identical with *Bacillus abortus* as he is of the worker who insists that no other organism except *Bacillus abortus* is worthy of consideration in fetal death and expulsion. Perhaps when some of the concerted attention now focused on the Bang organism has been in part diverted to a study of other organisms more definite results may be expected. As a matter of fact, one might assume that other factors have been recognized at the Bureau station, inasmuch as Dr. Schroeder states that inasmuch as not every diphtheroid growth in a child's throat can be laid to the Klebs-Loeffler bacillus, so can not all cases of abortion be the results of *Bacillus abortus*. If they are not due to this organism it is self-evident that they must be due to other factors; hence the logic and value of a suggestion that such other possible causes be given due consideration.

MISCELLANEA ANATOMICA
I. REMARKS ON ANATOMICAL INSTRUCTION AND STUDY

By SEPTIMUS SISSON

Professor of Anatomy, College of Veterinary Medicine, The Ohio State University, Columbus, Ohio

IT IS GENERALLY ADMITTED without argument that sound, practical and lasting anatomical knowledge is almost exclusively the product of careful and methodical work in the laboratory. But it is not sufficiently comprehended that such information can only be acquired slowly by the average student, and that it is therefore necessary to make very full provision in the schedule for this work. Still less does it seem to be realized that the training which the student should receive in the anatomical laboratory, in making full and accurate observations on the material and in acquiring the greatest possible skill in handling instruments, is of extreme value in subsequent courses, especially surgery, physical diagnosis, and pathology.

In order to make the transfer of this training as complete as possible it is essential that the methods used in the anatomical work should approximate as nearly as is feasible those to be employed in the courses in which the results of anatomical study are to be applied. Probably the best concrete example of what is here intended is the practice of studying the structure of the living animal by careful and thorough inspection and palpation. The writer has advocated this procedure for a good many years and is firmly convinced that college authorities make a very serious mistake if they fail to provide adequate facilities for this most valuable means of correlating the anatomical and clinical branches. In the limits of this report no detailed statement can be made of the numerous advantages of the method here strongly recommended. Many of these advantages will be evident at once to any wide-awake clinician and to every anatomical teacher who is sufficiently aware of clinical requirements in this respect.

The facilities for carrying out this mode of study and in-

struction are essentially the same as those for any other modern and strongly objective method—viz., necessary provision in the schedule for time, adequate quarters and material, and sufficient well-trained and experienced instructors. Good results can be obtained only when students are handled in small groups. The number of students in each group should, if possible, not exceed six. Subjects for this purpose should be kept immediately adjacent to the dissecting room, so that they are promptly available whenever desired during dissection, thus avoiding loss of time and disorganization of the work.

The method should be used in connection with the study of the skeleton and should be continued thereafter throughout the anatomical courses. In this way the student acquires skill and accuracy in observation and palpation as well as genuinely practical knowledge which furnishes a secure foundation for good clinical work. Scarcely less important is the fact that he gets an insight into the practical applications of his hard-earned anatomical knowledge and naturally takes a greater interest in his work. Finally, in conformity with the well-established psychological principle of association, the facts become more firmly established in his mind and can be readily recalled when needed.

In the dissecting room the student should use the same kind of instruments as are used in surgery as far as this is possible. At the beginning he usually needs to be taught how to handle them properly, to keep them clean and in good working order. Experience shows that very few students know how to sharpen a knife, and instructors should demonstrate this very elementary but essential procedure at once to prevent students getting into the bad habit of attempting to dissect with a blunt scalpel. Scissors—which should have both points blunt—are still not used nearly as much as they should be in dissecting. Perhaps this circumstance has had an important influence on veterinary operative technique. It is a notable fact that many veterinary surgeons use scissors to a very small extent as compared with their confrères in human practice. A very large amount of dissection can be done much more rapidly and effectively with scissors than with scalpels, and the acquirement of skill in this respect is good training for rapid, yet clean and safe, operative procedure later on.

The principle and practice of conservation in surgery have long been regarded as fundamental. But there has been little recognition of this idea in veterinary dissection until recently. Of course in the days of short courses and unpreserved subjects, dissection was largely a race against time and decomposition, and speed was therefore a prime necessity. In these days there is no such excuse for rough and slovenly work, at least in those colleges which allot a proper amount of time and instructional force to the anatomical department. Students should be taught, for example, that careful dissection and study of the fasciæ are necessary, since they are in many respects of great surgical importance and of much physiological interest. Some of us can recall that in our student days these ubiquitous membranes seemed to be regarded simply as a nuisance which concealed structures of real importance, and were therefore to be dealt with in the most summary manner possible. Similarly the limits of the joint capsules, synovial sheaths and bursæ should be studied accurately.

It seems decidedly advisable to require a student to dissect and learn the larger vessels and nerves even during the first year's work, when his chief concern is to gain a thorough knowledge of the bones, joints, muscles and viscera. The reasons for this are (1) that he may not get the careless habit established of reflecting skin, fasciæ and muscles without looking out for underlying structures—a habit difficult to overcome later when such procedure will prevent acquiring the kind of anatomical knowledge necessary for the successful practice of medicine and surgery; (2) that the student may acquire a sufficient working knowledge to form an adequate basis for good topographic dissections and for intelligent use of sections.

It would seem that the pedagogic difficulties which confront anatomical teachers are not fully appreciated by college authorities or even by their colleagues. These difficulties have increased during recent years until the conscientious teacher sometimes almost despairs of meeting them successfully. With the passing of the horse-doctor type of specialist and the great extension in the range of anatomical knowledge required in the clinical years of the curriculum, the problem of selecting from the vast array of anatomical facts those which are actually essential tests severely the judgment and courage of the most experienced

teacher. The physiologist, the pathologist, the surgeon, the professor of medicine each demands that the student must come to him provided with certain categories of anatomical facts. The sum of these irreducible minima is almost staggering, and it must be attained in two years by students fresh from the often painless methods of the high school, who must first be taught how to observe and to accumulate a difficult scientific terminology.

Attention may properly be directed here to an unfortunate and quite unnecessary difficulty encountered by instructors and students of anatomy. The reference is to the archaic and confused anatomical terminology which persists to a great extent in clinical instruction and literature. This is a serious hardship to the student and should be remedied promptly. It is high time clinical instructors ceased to speak or write of os innominatum, extensor suffraginis, flexor metatarsi, Steno's and Wharton's ducts, right and left sacs of the rumen, plantar nerves of the fore limb, etc. It should be clearly recognized that the determination of anatomical names and facts is to be left in the hands of their anatomical colleagues. It is true that anatomical terminology has been in a rather fluid state during the past decade, but it is equally true that great progress has been made in this respect in the anatomical instruction of our colleges; many useless synonyms have been dropped, undesirable names eliminated, and a long step taken toward a more uniform and sensible nomenclature. This change has removed a heavy burden from students in this very important branch, thus allowing their energy to be devoted more exclusively to the acquisition of really useful knowledge. It is very unfair to the student and entirely indefensible from a pedagogic standpoint that clinical instructors should attempt to inflict on him a mass of obsolete terms, many of which are no longer to be found in any anatomical work known to the student—some of them in fact have never occurred in any book on anatomy. Much of our clinical literature is badly in need of revision in this respect, and the opportunity might well be utilized to bring it up to date in other directions. It is earnestly desired by anatomical teachers that they may have the prompt and thorough cooperation of their colleagues in other branches in this matter.

But other difficulties are not so easily disposed of. The selec-

tion of matter is one of the hardest problems, as has already been indicated. We may eliminate minor attachments of muscles (especially those which are deep-seated), ignore the smaller vessels, and deal with the finer structure of the central nervous system and sense organs as briefly as is consistent with the demands of physiological study. On the other hand we may emphasize those regions where injuries and abscess formation are most common and where operations are frequently necessary. But shrapnel fragments, barbed wire and other traumatic agencies do not exercise any perceptible selective action, and in such cases the practitioner usually has no opportunity of refreshing his memory by reference to the literature.

The problem would be greatly simplified in some respects if it were known what field of activity the student intended to enter. But this matter is not usually decided till late in the course, and in many cases not then; often radical changes of work are made after graduation without any special preparation therefor. Some of our best medical schools are beginning to offer elective courses, partly to relieve the congestion in the required work, and partly to meet the needs of specialization in practice. Similar action in the veterinary colleges would no doubt be indicated if our students had as good biological training as is now required for entrance to the medical colleges, provided also that specialization in practice was established. Even under our present circumstances a small amount of elective work seems desirable. But this does not help matters much, as such work is chiefly additional and does not replace required courses.

It has long been customary to devote a considerable part of the time to routine lectures on anatomy. This practice must be abandoned or at least a great reduction made in the time so utilized. It is becoming generally recognized by thoughtful teachers that the lecture method is relatively inefficient and that the time can be much more effectively employed in quizzes and demonstrations. It is sometimes urged that the lecture is the best means by which the instructor can select the material and emphasize matters of greatest importance. But in general these desirable results can be secured better by the quiz and by laboratory conference and demonstration. In addition the latter methods provide the only adequate and reliable

means by which the instructor can keep constantly informed as to the progress of his students, and—a no less important desideratum—the student can gauge his success in his work. One of the most valuable features of the recitation is the training it gives the student in expressing himself accurately and clearly. In a properly conducted quiz the student is required chiefly to state the results of his observations in the laboratory, and it should not be possible for him merely to repeat statements which he has read or heard in lectures. It is decidedly stimulating to the student to know that he will frequently be called upon to demonstrate his knowledge of the subject and that his views will be subjected to the criticism of the instructor and of his classmates.

It must be admitted with regret that, with very few exceptions, our colleges have not made even fairly good provision for successful anatomical instruction. In general, the quarters allotted to the anatomical department are inadequate and not well designed for the purpose, salaries are insufficient to obtain or to retain well-trained instructors, and sufficient funds are not available for equipment and material. This state of things can not be permitted to persist in the development of our educational facilities if anatomical teachers are to be held responsible for the proper training of students in this important branch, on which so much of the subsequent work is based in a large degree. It would seem desirable that administrative officers inform themselves as to what has been done in this matter by the better class of medical schools, in which the anatomical department has received its due share of funds and facilities.

A good museum has always been regarded as an important feature of the college plant. Too often, however, it is chiefly a store room or a heterogeneous assemblage of curiosities and material of little instructural value. The development of an anatomical collection which is constantly and effectively used for teaching purposes is a very different matter. Its maintenance, growth and utility involve a large amount of expert work and no small expenditure. In order to furnish the desired information and to be directly available for inspection and study, specimens must be carefully selected and prepared, properly installed in containers and cases so as to be visible, and labeled and catalogued in order to be found readily. So far as

possible the arrangement should be such that the specimen need not be removed for examination. In some buildings halls and corridors can be used for the installation of cases containing specimens to which reference is frequently desirable. The placing of skeletons and other bone preparations (preferably in cases) in the dissecting room is very useful, as it furnishes the student with the means of refreshing his memory with regard to areas of muscular and ligamentous attachments, vascular and nervous relations to the bones, visible and palpable prominences, etc.

In addition to constant supervision in the dissecting room, students should be provided with printed or mimeographed dissection guides. This insures orderly and effective procedure and trains the student in careful and systematic methods of work. It also conserves the time and energy of instructors and makes it possible for them to demonstrate important points, assist the student in technical difficulties and quiz on the material in hand. Tact and judgment should be used in answering questions, and students should not be furnished with information which they can obtain without special difficulty. "Spoon feeding" is highly undesirable in the case of men who are preparing themselves to solve the problems of medicine and surgery.

Another difficulty is the matter of linking up the anatomical work with related branches of the curriculum. The need of correlation is of course unquestioned. The problem is to secure this correlation without undesirable overlapping. It has long been customary in anatomical study to deal with the action of joints and muscles and it is no doubt desirable to allude briefly to the functional significance of other structures. Pathological and clinical implications may also be mentioned with advantage at certain points. But considerable care is needed in this procedure, as there is a real danger of dislocating the student's attention from the main object—viz., the acquisition of anatomical knowledge. It seems best to insure a fuller comprehension on the part of the student of the professional objects of anatomical study and of its relations to the pathological and clinical branches by means of a course in applied anatomy which is organized in content and method for this specific purpose.

In order to keep this paper within reasonable limits it has

seemed necessary to confine attention mainly to principles and methods, and thus to omit consideration of some materials of instruction such as X-ray and other photographs, charts, lantern slides, models, etc. Reference to these and other matters of interest may be made at some future time.

In closing the writer feels the need of emphasizing the essential unity of the whole subject of anatomy and regards as a serious pedagogic error the unnaturally sharp division of the branches of the subject which is still prevalent in the organization and instruction of some of our veterinary schools. In this respect we might well pattern after the methods of the better type of medical colleges, in the great majority of which all of the anatomical work is included in one department. This is necessary in order to attain reasonable efficiency, coincident with the minimum expenditure of effort and money, and for the following reasons:

1. It is the only means by which the proper correlation of the various branches can be insured and the student enabled to gain a comprehensive and connected knowledge of the whole subject.

2. It is the only certain way to prevent unnecessary duplication of instruction and equipment.

3. It is the only favorable arrangement for advanced and graduate work, and thus for the broad and thorough training of men for research and teaching.

The foregoing advantages are of the greatest importance and there is little to put on the other side of the scales except prejudice, tradition and inertia—a trio which always stand in the way of progress. Unfortunately the situation is complicated by personal, departmental or college jealousies in many cases, and administrative authorities often prefer to "let sleeping dogs lie" in the hope that "things will work themselves out" or that death or mundane translation will remove some obstacles from the path of unpleasant duty.

Probably the only arguments which have been brought forward against the modern type of organization that are worthy of any consideration are (1) that it tends to inhibit specialization, and (2) that the practical applications of the subject are sacrificed, while the scientific or morphological aspects are unduly emphasized. With regard to the first of these objections

it may seem to be merely uttering a platitude to say that too early and too narrow specialization is to be avoided, but sometimes these obvious facts need to be reiterated. One becomes painfully aware of such need when we are confronted with the pedagogic crime of a man being put in charge of instruction in a major subject or an important branch immediately after graduation! On the other hand, experience has fully demonstrated that in a well-organized department judicious specialization is encouraged and cooperation in teaching and investigation soon becomes habitual.

With regard to the objection that in some departments the purely morphological or scientific data and concepts are emphasized at the expense of facts of immediate professional importance and of practical applications, it must be admitted frankly that this is quite too often the case and that it is a very serious defect in instruction. But this is not really a defect of organization. It is essentially a defect of personnel and is one which is by no means confined to the anatomical part of the curriculum. In many cases it is due to the instructor's lack of knowledge of the subject, since the instructor, of course, can teach only that which he knows something about. In other cases the teacher has little or no knowledge of, or interest in, the special requirements of veterinary students. Instances are not wanting of a feeling on the part of a professor that it is really beneath his dignity to teach veterinary students and that he can not condescend or trouble himself to organize the work to meet their needs. The incorporation of two or more of these deficiencies in one instructor is by no means uncommon, and the embodiment of all of them has been observed.

The eradication of rabies from Great Britain has been officially announced, and the muzzling order and restrictions on movements of dogs have been removed. After sixteen years of freedom of the United Kingdom from rabies the disease was reintroduced in 1918 by an imported dog which escaped the attention of the authorities. This one case is said to have been responsible for 129 cases of rabies in two counties. Other infected dogs were brought in during demobilization. The last known case occurred in June, 1921.

THE PRESENCE OF DIPHTHERIA ANTITOXIN IN THE BLOOD OF CERTAIN NORMAL HORSES AND ITS DEMONSTRATION BY THE SCHICK TEST

By H. W. SCHOENING

Pathological Division, Bureau of Animal Industry, Washington, D. C.

IN THE COURSE of experimental work with the Preisz-Nocard bacillus toxin and serum from normal horses it was deemed advisable to investigate the protective properties of serum from normal horses against several M. L. D.[1] of diphtheria toxin for guinea-pigs.

In reviewing the literature on this subject it was found that considerable attention was being given to the treatment of diphtheria in man in Germany by the use of normal horse serum, this method having been advocated rather strongly by several investigators and data submitted to substantiate their claims that the use of normal horse serum was as efficient as specific antitoxin. Numerous reports on the application of normal horse serum in the treatment of diphtheria in man showed, however, that it was not as efficient as specific antitoxin, while experimentally it was proved that normal horse serum possessed some degree of neutralizing toxin, but that it was slight compared to specific antitoxin.

Minett (1) has reported the recovery of diphtheria bacilli from the horse. He states that but one previous instance in which diphtheria bacilli have been recovered from the horse is recorded—that by Cobbett in 1900. The latter also observed at that time that ten out of thirteen horses examined contained antitoxin in their blood.

To determine the protective properties of normal horse serum against diphtheria toxin the following procedure was employed: One cubic centimeter of serum from a normal horse was mixed with 2 M. L. D. for guinea-pigs; the mixture was left to stand for one hour at room temperature and then injected subcutaneously into a guinea-pig.

The M. L. D. of the diphtheria toxin was determined as the smallest amount of toxin which was invariably fatal to medium-

[1] Minimum lethal dose.

sized guinea-pigs in ninety-six hours after subcutaneous inoculation.

Table 1 shows the results of an experiment conducted September 23, 1920, in which 2 M. L. D. of diphtheria toxin were mixed with 1 c. c. of serum from normal horses, the mixture left to stand at room temperature for 1 hour, and then injected subcutaneously into guinea-pigs.

TABLE 1.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH NORMAL HORSE SERUM AND DIPHTHERIA TOXIN

Guinea-pig No.	1 c.c. serum from normal horses. Sample No.	Diphtheria toxin, 2 M.L.D. (C. C.)	Date injected	Result
1	122	0.02	Sept. 23, 1920	Dead Sept. 26, 1920
2	181	.02	do.	Dead Sept. 25, 1920
3	185	.02	do.	do.
4	192	.02	do.	Survived
5	268	.02	do.	Dead Sept. 25, 1920
6	491	.02	do.	do.
7	159	.02	do.	Dead Sept. 27, 1920
8	S-188	.02	do.	Survived
9	216	.02	do.	Survived
10	92	.02	do.	Dead Sept. 25, 1920
11	A	.02	do.	Dead Sept. 27, 1920
12	201	.02	do.	Dead Sept. 25, 1920
13	188	.02	do.	do.
14	194	.02	do.	Survived
15	203	.02	do.	Dead Sept. 25, 1920
16	120	.02	do.	do.
17	126	.02	do.	Survived
18	.....	.02	do.	Dead Sept. 25, 1920
19	.....	.02	do.	do.
20	.....	.02	do.	do.
21	.....	.01	do.	Dead Sept. 27, 1920

Summarizing, Table 1 shows seventeen serums from normal horses in quantities of 1 c. c., mixed with 2 M. L. D. of diphtheria toxin; the mixtures stood at room temperature for 1 hour and were then injected subcutaneously into guinea-pigs. Of this number, serum from five horses, or about 30 per cent, protected guinea-pigs. Repeated tests on the serums giving protection resulted as originally.

Samples Nos. 192, 194 and 126, showing protective properties, and samples Nos. 122, 181, 185, 268, 491, 159, 201, 194, 203 and 120, showing no protection, were obtained from horses on the range of one of the Indian Reservations in Arizona, and had been forwarded to the Pathological Division for the serum test for dourine. These samples had given negative results to the test for this disease.

Samples Nos. S-188 and 216, giving protection, were obtained from work horses at the Bureau Experiment Station at Bethesda, Md. The history of these horses over a period of years

shows that they were never injected with, or intentionally exposed to, diphtheria toxin or bacilli.

One cubic centimeter each of samples Nos. 192, 194, 126, S-188 and 216 was mixed with an L+ dose of diphtheria toxin; the mixture was allowed to stand at room temperature for 1 hour and was then injected subcutaneously into guinea-pigs. The pigs in every case died within the same period as the toxin control pigs, indicating that these serums contained less than 1 unit of antitoxin per cubic centimeter. No attempt was made to determine the amount of antitoxin in these serums by Römer's method.

To determine whether serums of normal animals other than horses, used in quantities of 1 c. c., would neutralize 2 M. L. D. of diphtheria toxin, the following experiment was made: One cubic centimeter of serum from each of five normal rabbits and one guinea-pig was mixed with 2 M. L. D. of diphtheria toxin; the mixture was left to stand at room temperature for one hour and then injected subcutaneously into guinea-pigs. In no case did any of these serums show any protective properties.

TABLE 2.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH RABBIT AND GUINEA-PIG SERUM AND DIPHTHERIA TOXIN.

Guinea-pig No.	1 c.c. serum	Diphtheria toxin 2 M.L.D. (C.C.)	Date injected	Result
1	Rabbit 1	0.08	Oct. 24, 1921	Dead Oct. 27, 1921
2	Rabbit 2	.08	do.	do.
3	Rabbit 3	.08	do.	do.
4	Rabbit 4	.08	do.	do.
5	Rabbit 5	.08	do.	do.
6	Guinea-pig 1	.08	do.	do.
7	.....	.08	do.	do.
8	.....	.08	do.	do.
9	.....	.08	do.	do.
10	.....	.04	do.	Dead Oct. 28, 1921

THE SCHICK TEST (2)

One cubic centimeter of serum from each of twelve horses from the Bureau Experiment Station at Bethesda, Md., whose history over a period of years showed they had never been injected with diphtheria toxin or bacilli, was mixed with 2 M. L. D. of diphtheria toxin, the mixture left to stand at room temperature for 1 hour and then injected subcutaneously into guinea-pigs. The results are shown in Table 3.

Of the twelve serums tested, four gave protection to guinea-pigs against 2 M. L. D. of toxin.

TABLE 3.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH HORSE SERUM AND DIPHTHERIA TOXIN.

Guinea-pig No.	1 c.c. serum normal horse Sample No.	Diphtheria toxin, 2 M.L.D. (C.C.)	Date injected	Result
1	116	0.08	Nov. 22, 1921	Dead Nov. 25, 1921
2	194	.08	do.	do.
3	241	.08	do.	do.
4	242	.08	do.	do.
5	243	.08	do.	do.
6	244	.08	do.	do.
7	245	.08	do.	do.
8	246	.08	do.	do.
9	240	.08	do.	Survived
10	54	.08	do.	do.
11	216	.08	do.	do.
12	128	.08	do.	do.
13	.....	.08	do.	Dead Nov. 25, 1921
14	.....	.08	do.	do.
15	.....	.08	do.	do.
16	.....	.08	do.	do.
17	.....	.04	do.	Dead Nov. 26, 1921

It was decided to apply the Schick test to all of these animals in order to determine the specificity of the protective properties of these serums.

Technic of the Test (3): The Schick test consists in the injection between the layers of the skin of a small amount of diphtheria toxin. The test, which is a purely local reaction, depends on the principle of the destructive action of diphtheria toxin on surrounding tissue cells with subsequent inflammation of the part. A positive reaction indicates an absence of antitoxin in the individual, while a negative reaction indicates that the toxin has been neutralized by antitoxin.

In applying the Schick test to human beings it is the usual practice to inject one-fiftieth of a guinea-pig M. L. D. suspended in 0.1 c. c. or 0.2 c. c. saline solution into the layers of the skin of the forearm below the bend of the elbow. As a control the same amount of toxin heated at 75 degrees C. for 10 minutes (which destroys the toxin) is injected in a similar manner in the other arm. This serves to act as a control on the autolyzed protein of the diphtheria bacillus present in the test fluid.

In applying the test to horses it was considered advisable to use as the test dose a larger amount than was used in human beings, the desired quantity being that amount which would give a positive reaction where there was no antitoxin, but not so large an amount as to produce sloughing at the site of injection. The proper amount of toxin was found to be 1½ M. L. D. for the guinea-pig, suspended in 0.3 c. c. salt solution.

The M. L. D. was found to be 0.04 c. c. A dilution of 1 part of toxin to 4 parts of salt solution was then made; 0.3 c. c. of this mixture contained 0.06 c. c. of toxin, or 1½ M. L. D.

The site of the injection was the lower eyelid, and the technic employed was the same as that used in the intradermic or intrapalpebral mallein test (4). The test should be applied only when there is no inflammatory condition of the eye. A twitch should be applied to the upper lip or the ear of the animal so that the head may be held still during the operation. The injection is made into the dermis of the lower lid, about one-third of an inch from the edge, and halfway between the inner and outer canthi. It is not necessary to disinfect the site of injection.

A Leur syringe and 26-gauge needle were used, and 0.3 c. c. of the toxin was injected into the lower lid of the left eye. As a control on the autolyzed protein of the diphtheria bacillus contained in the test fluid, 0.3 c. c. of a dilution of the toxin (1 to 4) which had been heated at 75 C. for 10 minutes was injected into the lower lid of the right eye.

The following horses were tested: Nos. 116, 194, 241, 242, 243, 245, 216, 128, 240 and 54.

A positive reaction begins to make its appearance in 24 hours, and is at its height in 48 hours. The reaction begins with a swelling of the lower eyelid, which is very marked in 48 hours, at which time the upper eyelid may be affected, the eye being half closed from the edema of the lids. In some cases there is considerable lacrimation, followed by a serous discharge containing pus flakes or entirely purulent in character. In most cases there is a peeling of the epidermis at the point of injection, leaving a somewhat raw appearance as if the skin had been scraped with a dull knife. The eye is sensitive to light and appears painful. After 48 hours the swelling diminishes, and the eye returns to normal in one week or less, leaving a somewhat scaly appearance of the epidermis of the lower lid.

The following horses gave a positive reaction to the Schick test: Nos. 116, 194, 241, 242, 243, 245. The reaction was well marked in each instance and could be easily seen at a distance. The following horses gave a negative reaction: Nos. 216, 128, 240 and 54. The control eye in each case was observed carefully at

each reading, but in no instance was there any swelling, the eye remaining unchanged. The results are shown in Table 4.

TABLE 4.—SCHICK TEST.

Horse No.	Schick test	Antitoxin in serum
116	+	None
194	+	do.
241	+	do.
242	+	do.
243	+	do.
245	+	do.
216	−	Present
128	−	do.
240	−	do.
54	−	do.

It will be seen from Table 4 that those animals whose serums showed antitoxic properties gave a negative Schick test, while those animals whose serum showed no antitoxic properties gave a positive Schick test.

Ten days after the test serum was drawn from the horses which had given a positive reaction. One cubic centimeter of serum from each animal, drawn before the Schick test (B) and ten days after the test (A), was mixed with 2 M. L. D. of toxin, left to stand at room temperature 1 hour, and injected subcutaneously into guinea-pigs. The results are shown in Table 5.

TABLE 5.—EXPERIMENT WITH SERUM DRAWN BEFORE AND AFTER SCHICK TEST.

Guinea-pig	1 c.c. serum[1] from horse No.	Diphtheria toxin, 2 M.L.D. (C.C.)	Date injected	Result
1	116–B	0.08	Dec. 20, 1921	Dead Dec. 23, 1921
2	116–A	.08	do.	Dead Dec. 27, 1921
3	243–B	.08	do.	Dead Dec. 23, 1921
4	243–A	.08	do.	Survived
5	241–B	.08	do.	Dead Dec. 23, 1921
6	241–A	.08	do.	Survived
7	242–B	.08	do.	Dead Dec. 23, 1921
8	242–A	.08	do.	do.
9	245–B	.08	do.	do.
10	245–A	.08	do.	do.
11	194–B	.08	do.	do.
12	194–A	.08	do.	do.
13	.....	.08	do.	do.
14	.....	.08	do.	do.
15	.....	.08	do.	do.
16	.....	.04	do.	Dead Dec. 24, 1921

[1] B denotes serum drawn before Schick test; A, serum drawn ten days after Schick test.

Horses Nos. 243 and 241, whose serum gave no protection before the injection of the toxin for the Schick test, 10 days after the test gave complete protection, while the serum of horse No. 116 gave protection for 7 days. It is of interest to note that these horses did not give as intense a Schick reaction as horses Nos. 194, 245 and 242.

January 3 a second Schick test was made on horses Nos. 194, 245, 242, 243, 244 and 116, with the results shown in Table 6.

TABLE 6.—SECOND SCHICK TEST.

Horse No.	First Schick test, Dec. 5, 1921	Antitoxin in blood before first test	Antitoxin in blood 10 days after first test	Second Schick test Jan. 3, 1922
194	+	None	None	+
245	+	do.	do.	+
242	+	do.	do.	+
243	+	do.	Present	−
241	+	do.	do.	−
116	+	do.	do.	−

Horses Nos. 243, 241 and 116 gave a negative reaction, while horses Nos. 194, 245 and 242 gave a positive reaction, which, however, was not as marked as in the first test.

Sufficient antitoxin was produced in horses Nos. 243, 241 and 116 as a result of the intradermic injection of diphtheria toxin in the first Schick test to allow the same to be demonstrated in the blood of these animals ten days after the test, and to give a negative Schick reaction four weeks after the first test.

DISCUSSION

From the foregoing work it appears that serum from about 30 per cent of normal horses used in quantities of 1 c. c. will protect guinea-pigs against 2 M. L. D. of diphtheria toxin. That this protection is due to specific antitoxin is indicated by the following facts:

(1) That serum from all normal horses does not contain this property.

(2) That a limited test on serums from five normal rabbits and one guinea-pig showed none of these serums to contain protective substances.

(3) That those horses whose serums showed no protective properties against diphtheria toxin gave a positive Shick test in 100 per cent of the cases tested, while those horses whose serums showed protection gave a negative Schick test in 100 per cent of the cases tested.

Minett in his article on diphtheria bacilli in the horse states that Cobbett from his experience was of the opinion that the horse should be considered as a possible source of diphtheritic infection in man. Minett is more of the opinion that the horse

receives the infection from man, wounds being easily infected with the diphtheria organism from some human attendant who happened to be suffering with diphtheria or was an actual carrier.

The writer is of the opinion that the diphtheria antitoxin found in the blood of certain normal horses is there as a result of infection with the diphtheria bacillus. It is quite common for horses to have wounds about the fetlocks and hoofs (calk wounds, interfering wounds, etc.), and it is probable that the diphtheria organism infecting these wounds results in the production of a limited amount of antitoxin.

The source of the diphtheria organisms infecting wounds is problematical, but the fact that certain serums containing antitoxin were from horses on one of the Indian Reservations in Arizona, where these animals were running on the open range as wild horses, and practically never in contact with human beings, leads to the belief that the infection is not obtained from human beings, but rather that the diphtheria organism is widespread in the soil or finds favorable medium for propagation in horses or in their surroundings.

CONCLUSIONS

1. There is a limited amount of diphtheria antitoxin in the blood of about 30 per cent of normal horses, sufficient to protect guinea-pigs against 2 M. L. D. of toxin.

2. The antitoxin in the blood of these horses is probably there as a result of infection of wounds with diphtheria bacilli, which may be present in the soil or surroundings of horses.

3. The Schick test applied to six horses whose serums showed no antitoxin resulted in positive reactions in all cases, while the test applied to four horses whose serums contained antitoxin resulted negatively in each case.

4. In certain horses sufficient antitoxin was produced by the Schick test for these animals to give a negative reaction four weeks later, and the antitoxin was demonstrable in the blood ten days after the first test.

5. The Schick test, as pointed out by Hitchens and Tingley (5), should be of practical value in determining the suitability of horses for the production of diphtheria antitoxin.

BIBLIOGRAPHY

1. MINETT, F. C. Diphtheria bacilli in the horse. Jour. Compar. Path. and Ther., vol. 33, part 4, Dec., 1920.
2. SCHICK, R. Munchen. Med. Wchnschr., 1913, vol. 9, p. 2608.
3. ZINGHER, A. Practical applications and uses of the Schick test. Jour. Lab. and Clin. Med., vol. 6, No. 3, Dec., 1920.
4. The ophthalmic and intradermic tests for glanders. Dept. Agr., Bur. Anim. Ind., Leaflet A. I. 35, 1919.
5. HITCHENS, A. P., and TINGLEY, E. K. The selection of horses for the production of diphtheria antitoxin by an intrapalpebral toxin test. Jour. Immunol., June, 1917, vol. 2, No. 4.

THE NATIONAL RESEARCH COUNCIL

Many scientists lack the library facilities which their work demands. They are compelled either to journey to distant libraries or to try to borrow books by mail. Often it is difficult for them to locate something that is badly needed, and again it may be impossible to borrow it.

The Research Information Service of the National Research Council is prepared to assist investigators by locating scientific publications which are not generally or readily accessible. It will also, as is desired, have manuscripts, printed matter or illustrations copied by photostat or typewriter. No charge is made for this service unless an advance estimate of cost has been submitted and approved by correspondent.

Requests for assistance should be addressed, National Research Council, Information Service, 1701 Massachusetts Avenue, Washington, D. C.

VETERINARY WORK IN AFRICA

One of the services recently rendered by the Bureau of Animal Industry was that of assisting the veterinary adviser of Uganda, a British protectorate in Africa, in organizing the veterinary work of that region. This bureau receives numerous requests from foreign countries for assistance in the organization and perfection of various livestock activities. These requests deal with the solution of both technical and executive problems. The cooperation and good will of many foreign veterinary services have resulted in procuring valuable data on livestock and their products, tests, diseases, and prevailing conditions and methods. Such information is often of great value in connection with the department's quarantine service and in numerous technical matters.

WHY DOES AN ANIMAL AFFECTED WITH GLANDERS GIVE A REACTION WHEN INJECTED WITH MALLEIN, WHILE A HEALTHY ANIMAL DOES NOT? [1]

By R. A. ARCHIBALD
Oakland, California

THE EXPLANATION of mallein phenomena is based upon two theories. The first theory, which prevailed up to a few years ago, had for its foundation the so-called Ehrlich side-chain or receptor theory. The second is based upon the newer theory of ferments and antiferments as advocated by Abderhalden, Friedberger, Vaughn, Bordet, Jobling, Peterson and others.

While the Ehrlich theory falls short of fully accounting for the changes manifested by the tissues of glandered animals when exposed to the influence of mallein, at the same time it has furnished a stimulus for the further study of the phenomena incidental to immunity and anaphylaxis that has proven to be of inestimable value from an immuniological standpoint, and it is well worthy of discussion in this connection.

Ehrlich assumed that the cells of the body obtain their nutrition from the blood or lymph with which they come in contact. This power of appropriating food on the part of cells is vested in certain cell substances which he calls cell receptors, having a combining affinity for food substances. These receptors may be of simple constitution, adapted to taking up relatively simple substances, or they may be complex and able to anchor large and complex molecules of various kinds. Each body cell may possess a large quantity or number of receptors of different combining affinities and different degrees of complexity.

It can be readily understood that when bacteria or other foreign cells or their products are introduced into the body proper, the combining affinities of certain receptors may be satisfactory for the bacterial substances which are protein in character, just as they are satisfactory for food substances. The tendency is, according to Ehrlich, for cells to acquire greater quantities or numbers of receptors having a specific combining affinity for

[1] This paper was prepared by Dr. Archibald several months before his death, which occurred February 4, 1922. It was read at a meeting of the Bay Counties Veterinary Medical Association of California, March 14, 1922.

protein elements, bacterial or otherwise, when constantly exposed to such protein elements.

For instance, if, according to Ehrlich, we introduce the products of the glanders bacillus into a susceptible animal, or if such products are produced in such an animal as a result of an infection in the ordinary way, certain cells of the body acquire, as a result of the stimulation due to constant exposure or contact with such bacterial products, a large number of cell receptors having a combining affinity for the protein (toxic) products of the glanders bacillus. As a result of this increase of cell receptors, sufficient toxic elements of the glanders bacillus may be anchored to the cells, causing injury or destruction, and producing all the clinical manifestations of glanders or the phenomena observed when mallein is brought into contact with the tissues of a glandered animal locally or when injected subcutaneously and is taken up by the circulation, producing disturbances of a systemic nature.

In other words, when the cells of the body are constantly exposed to a protein substance, which may be or may not be toxic in character, these cells become, as it were, sensitized to that particular protein to an extent that, if sufficient protein (toxin) is available, enough may become anchored to the cells to cause their destruction or at least injury to them. It is this destruction or injury of cells which is manifested as the clinical symptoms of glanders or in the mallein reaction.

When mallein, then, is brought into contact with the sensitized cells of the glandered animal, its toxic elements, through the medium of Ehrlich's receptors, combines with such cells, causing injury or destruction, and as the result of such injury the cells lose their functional activity, and changes such as acidosis and other inflammatory phenomena are a sequence. Acidosis is a term applied to a condition where, as a result of functional derangement of cells, there is an increase in the production and retention of lactic acid or carbon dioxide which causes such cells or tissues to acquire a marked affinity for moisture from any source, hence the swellings and edemas incidental to mallein reactions.

When mallein is brought into contact with the cells of a healthy animal, the cells of such animal, not having been exposed to stimulation by the glanders bacillus protein, possess

no cell receptors having a combining affinity for the toxic products contained in the mallein. Such toxic products are consequently not anchored to the cells and can not produce injury, and they are eliminated by the ordinary channels of elimination without effecting damage of any nature, hence no anaphylactic or allergic reaction results.

It is a well-known fact that many glandered horses that have recently been given the mallein test (subcutaneous) will not react until five or six weeks have elapsed following the application of such a test. The reason for this, according to the Ehrlich theory, is that following the first injection of mallein and the consequent anchoring of large quantities of the toxin to the sensitized cells through the medium of the specific cell receptors, overstimulation of the cells is a result and cell receptors are produced in quantities beyond the capacity of the cells. As a result, the surplus cell receptors specific in character are discharged into the blood stream, constituting what Ehrlich calls free receptors or antitoxins. These free receptors, when exposed to the toxin molecules contained in the injected mallein, combine with them and render them inert before they can become fixed to the cells and cause injury; in other words, the animal is in a condition of either temporary or permanent immunity.

The foregoing explains, according to the Ehrlich theory, the difference between anaphylaxis and immunity. Anaphylaxis is the condition in which cells have become sensitized by being endowed with large quantities or numbers of cell receptors having a specific combining affinity for the toxin under consideration, while immunity is that condition where the individual has passed through the anaphylactic process, and its blood and body fluids have become saturated with free receptors whose mission it is to anchor and render inert toxic molecules before they can reach the cells.

According to the foregoing, Ehrlich's idea has been that anaphylactic or allergic reactions, such as those caused by mallein, are essentially and necessarily a cellular manifestation; but the fact that anaphylaxis can be passively transferred from one animal to another tends to disprove his theory in part at least.

The second theory, advocated by such authorities as Abderhalden, Bordet, Friedberger, Vaughn, Jobling, Peterson and

others, is based upon the assumption that the metabolic changes which go on in the body are regulated and controlled by elements known as ferments and antiferments. Just so long as these elements are present in normal amounts maintaining a proper balance the various physiological functions of the cells, tissues and body go on in a normal manner. On the other hand, if the inhibition or destruction of either of these elements occurs, then the metabolic order of things is upset and pathological changes result.

That there are such elements as ferments and antiferments can be and has been readily proven, so that in the discussion of this theory we are not dealing with hypothetical substances as in the case of the Ehrlich receptor theory.

If we accept the theory of ferments and antiferments we can quite easily reconcile ourselves to the popular idea in this connection that pathological changes in cells, tissue or the body as a whole incidental to the presence of bacteria or their products are not directly due to the reaction of such bacteria or their products. It appears that when bacteria and their products gain entrance to the body parenterally such substances undergo proteolysis, which lytic action renders available end products possessing anti-anti-tryptic characteristics. These anti-anti-tryptic end products, which are probably in the nature of lipoids, have the power of combining with or anchoring antiferments, rendering them inert or inhibiting their action. As a result of this the ferments which have been held in abeyance or under control by these antiferments are free to perform their function unrestricted, and autolysis or autodigestion of the individual's own cells or tissues is the sequence.

To recapitulate: First, we have proteolysis of bacteria or their products (toxins), with the liberation of end products anti-anti-enzymic in character; and, second, proteolysis (autodigestion) of the infected individual's own cells or tissues, giving rise to the various local and general inflammatory symptoms which constitute the clinical manifestations of a disease.

It is an accepted fact that of the two processes above described, the first lytic action—that is, the proteolysis of the invading organism or its products—is more or less a specific action, consequently the lytic elements (amboceptors) capable of bringing about such proteolysis are present in much greater

quantities or numbers in the body fluids of an animal undergoing active immunity or one that has become actively immune. Hence, when into such immune or partially immune animals bacteria or their products are introduced, the specific proteolytic substances perform their function, rapidly liberating anti-antiferment substances in such quantities and in such a short space of time that large quantities of ferments act unrestricted, producing antodigestion of cells and tissues. It is obvious, of course, that the severity of the clinical manifestations, whether local or general, will depend upon the amount of ferments that have been set free by the inhibition of the antiferment.

Now, coming down to the question of the mallein reaction, we must realize that an animal affected with glanders is undergoing active immunity processes, and, as a result, contains in its blood and body fluids specific immune elements proteolytic in character, whose mission is to digest and dissolve the glanders bacilli and their products which are constantly growing and being elaborated. Digestion of the glanders bacilli or their products by these specific proteolytic or bacterialytic elements render available as end products the elements which have the power of inhibiting antiferment. If mallein is injected into the glandered animal, or is brought into contact with active tissues, certain protein elements contained in such mallein undergo specific proteolysis, from which result end products probably lipoidal in character, which fix antiferment, permitting ferment to attack unrestricted the cells and tissues, giving rise to the clinical manifestations which are recognized as a reaction.

If mallein is injected into a healthy animal no reaction takes place, because the blood and body fluids of the normal animal do not contain specific proteolytic substances for the glanders bacilli or for the protein elements contained in mallein; hence there is no inhibition of antiferment and no liberation of ferment; consequently there is no destruction of cells or tissues.

Of course there is always some proteolysis of bacteria, bacterial products or any foreign protein introduced parenterally into the healthy nonimmune animal, but in the absence of specific bacteriolytic or proteolytic substances lysis or digestion of such foreign protein goes on so slowly and so gradually that no appreciable damage is brought about by the liberated ferments.

It might be interesting to state in this connection that there are three major stages of a disease from an immuniological standpoint—namely, incubation, anaphylaxis, and immunity. The incubation period is the time which elapses between the entrance of the invading organism and the first appearance of clinical symptoms, which represents the anaphylactic phenomena. The anaphylactic period continues until convalescence or immunity becomes evident.

In the case of glanders, it being a slow type of infection, there are no well-marked lines of demarcation between the three periods, hence the amount of anaphylaxis or immunity possessed by an affected animal will undoubtedly have an important bearing upon the severity and character of the reaction following the exhibition of a dose of mallein.

THE HORSE IS COMING BACK

The fourteen principal markets of the Central West show a total of 53,241 horses received the first two months of 1922. In a report just issued by the Horse Association of America, this shows a gain of 2,402 head, or 4.6 per cent. These figures do not take into consideration the chief eastern markets—Boston, Buffalo, New York and Philadelphia.

Wayne Dinsmore, secretary of the association, stated that the demand for horses is steadily improving throughout the country by reason of renewed activity in building, excavating, road construction and general merchandising. Paul Connolly, a well-known horseman of Philadelphia, stated that more horses had been sold in that city in the past three months than in any corresponding three months in the last ten years.

The demand for saddle horses is greater this year than it has ever been. Greater interest all over the country in horseback riding is the reason, according to horse authorities, for the spring's heavy demand for well broken, well bred saddle horses. Three weeks ago the sales in Lexington, Ky., set new records in the saddle horse field.

McINTOSH AND FILDES METHOD FOR ATTAINING SURFACE GROWTH OF OBLIGATE ANAEROBES

By WILLIAM S. GOCHENOUR

Pathological Division, Bureau of Animal Industry, Washington, D. C.

IN THE FIELD of anaerobic study, success or failure depends primarily on the isolation of the anaerobic microorganisms in pure culture. While this can be accomplished in several different ways, probably the method in most common use at the present time is that of deep agar culture.

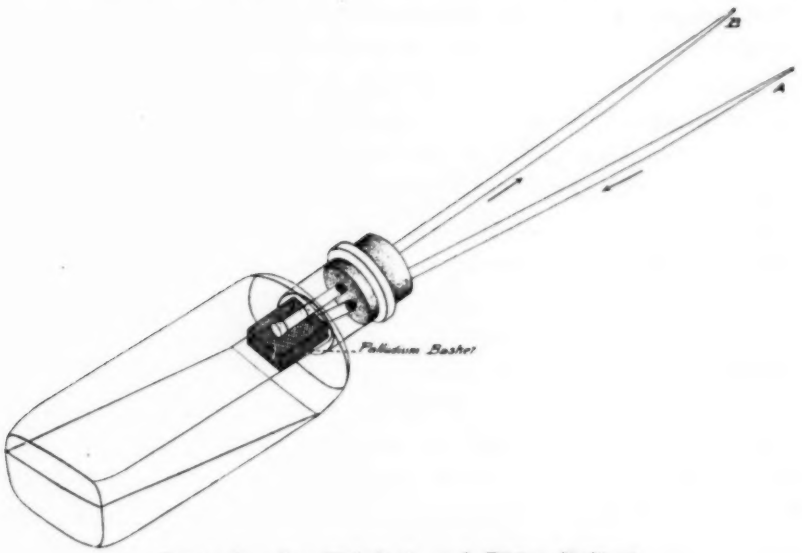
Without discussing the shortcomings of the several methods of anaerobic culture, it is the purpose of this paper to present the method devised by McIntosh and Fildes, which is one of surface plating in single test tubes in which deoxygenization is accomplished by means of the catalytic properties of metallic palladium. The method is very simple, requires but a little time to perform, and seldom if ever fails to produce well-developed surface colonies that compare favorably with aerobic surface colonies. In fact, the whole process is so quickly performed that it takes very little longer to make anaerobic cultures than to make aerobic cultures. This great advantage, together with the uniformly good results obtained, makes the process admirably adapted to every-day routine work. Furthermore, the fact that each individual tube is an anaerobic apparatus in itself is a factor of very great importance, because examination of each culture tube can be made without disturbing any other anaerobic tubes that may have been inoculated from the same or different materials under study. This is in direct contrast to those methods where a number of cultures are placed in a large jar in which deoxygenization has been effected by any one of the several methods.

Pfuhl (1) in 1907 made use of the catalytic properties of spongy platinum to obtain anaerobic cultures in broth tubes exposed to the air. Laidlaw (2) in 1915 suggested the use of platinized charcoal and colloidal platinum to remove the oxygen from anaerobic cultures. It was McIntosh and Fildes (3), however, who were the first to use a palladium catalyzer in surface cultivation.

The method about to be presented requires a minimum of apparatus. The only materials required in addition to the Kipp hydrogen generator are a number of soft rubber stoppers, with two perforations through each, glass tubing to fit, and small wire cloth carriers in which asbestos impregnated with palladium is held.

For the purpose of clearness a diagram of the apparatus is given instead of a verbal description. It will be observed that the only explanation necessary is the preparation of the palladium asbestos basket, which is made as follows:

One-fourth of a gram of finely divided arsenic-free asbestos



Apparatus for McIntosh and Fildes Method

wool is placed in a porcelain evaporating dish, and 1.5 c. c. of a 10 per cent solution of palladium chloride is added. In making this solution of palladium chloride it is usually necessary to add a few drops of concentrated hydrochloric acid to effect a perfect solution. The asbestos wool thus treated is then dried in the incubator over night, after which it is covered with carbon in a smoky gas flame and the palladium chloride reduced with a blow-pipe or reducing flame. The palladium-impregnated asbestos wool is then inclosed in a basket made of brass or copper wire gauze of approximately 30 meshes to the inch.

The method of operation is quite simple. Connect one end of the glass tubing *A*, which has been drawn to capillary bore,

to the hydrogen generator. Start the hydrogen generator and allow the gas to flow for one or two minutes. In this way the greater part of the air in the test tube is displaced by hydrogen. Seal off the free end of the outlet tube *B*, disconnect the apparatus from the hydrogen generator, rapidly seal off this intake tube, and shellac the cork to prevent leakage. Whatever oxygen remains in the tube, together with the oxygen emanating from the medium, combines with the hydrogen present until deoxygenation is complete. The combustion that occurs after the tips of the glass tubes are sealed will produce a slight negative pressure in the test tubes.

It has been the experience of the writer that any method of surface plating presents several decided advantages over the deep agar method as a means of the separation of anaerobes. Surface colonies will permit the more ready detection of more than one species of anaerobe should a mixture exist, because there are many of them that produce lenticular colonies in deep agar, yet they will produce very characteristic surface colonies. Furthermore, certain anaerobes are encountered that grow so feebly in agar that their colonies in deep agar are invisible to the naked eye, yet on the surface they produce a spreading film that is readily detected, and contamination therewith can be avoided.

The single-tube method here presented has the advantages over the methods involving the McIntosh and Fildes jar and Smillie's (4) and other modifications of the McIntosh and Fildes jar, in that the single-tube method is far more rapid of operation than the jar methods, also when cultivating a number of dilutions any one culture or dilution can be examined at any time without disturbing other cultures. This is impossible in the use of the several jar methods. By this method the most obligatory anaerobes can be easily grown on an agar surface regularly, and gross mixtures can thereby readily be separated.

It is for the reasons given above that the writer feels justified in recommending the McIntosh and Fildes single-tube method for routine and special anaerobic cultivation.

REFERENCES

PFUHL, E. Die Zuchtung anaerober Bakterien in Leberbouillon, sowie in Zuckerbouillon und in gewohnlicher Bouillon mit einem Zusatz von Platin schwamm oder Hepin unter Luftzutritt. Centbl. Bakt., etc., Orig., 1907, Bd. 44, p. 379.

LAIDLAW, P. P. Some simple anaerobic methods. Brit. Med. Jour., 1915, vol. 1, p. 497.
MCINTOSH, JAMES, and FILDES, PAUL. A new apparatus for the isolation and cultivation of anaerobic microorganisms. Lancet, 1906, p. 768.
SMILLIE, WILSON G. New anaerobic methods. Jour. Expt. Med., vol. 26, p. 59, July, 1917.

The Field Inspection Division and the Quarantine Division of the B. A. I. were consolidated, effective May 1, under the title, Field Inspection Division. This division functions in cooperating with States in the eradication of sheep, cattle and horse scabies, dourine and anthrax. It also has charge of stock yards inspection, including the immunization of swine intended for stocker or feeder purposes, the enforcement of the 28-hour law, the inspection and quarantine of import animals, the inspection and testing of animals for export, the supervision of the importation of animal by-products, the fitting of vessels for carrying export animals, and other matters relating to the protection of our livestock industry against losses from disease.

Dr. E. P. Schaffter, inspector in charge of the meat inspection station at Detroit, Michigan, has been instructed to represent the Bureau at the meeting of the Michigan State Veterinary Association to be held at Detroit, June 28, 29 and 30.

Dr. A. W. Miller, Chief of the Field Inspection Division, B. A. I., has just returned from a trip through the Northwest, where he discussed with Bureau representatives, State officials and livestock owners plans for conducting cooperative sheep and cattle scabies and dourine work during the present season. While in the Northwest Dr. Miller attended the meeting of the Montana Livestock Growers' Association, which was held at Butte, Montana, April 18 and 19, and read a paper on the subject of "Livestock and Animal Disease Outlook."

Dr. Joseph M. Arburua has moved from Hanford, Calif., to San Francisco, Calif., where he and Dr. John McInnes will start in practice, having formed a partnership to take over the business of Dr. E. J. Creely, at 1190 Market Street, San Francisco.

DAVAINEA PROGLOTTINA, A PATHOGENIC CESTODE, IN AMERICAN POULTRY [1]

By HOWARD CRAWLEY
Philadelphia, Pennsylvania

IN A CASE REPORT published in the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION for January, 1922, pages 461-462, by the present author in collaboration with Dr. E. L. Stubbs, attention is called to the pathogenic effects on chickens of roundworms belonging to the genus *Capillaria*. It is further noted that owing to the small size of these worms, and their occurrence deeply embedded in the copious mucus which accompanies such infestations, they are readily overlooked, a microscopical examination of the mucus being required for their detection.

There is, however, another helminth present in chickens which is also pathogenic, very small, causes the secretion of a copious supply of mucus in which it lies embedded, and in consequence its presence will be overlooked unless the microscope is used. This is *Davainea proglottina*, a tapeworm.

It is described on page 47 and illustrated on plates 15 and 16 of Bulletin 12 of the Bureau of Animal Industry of the United States Department of Agriculture. This bulletin was written by Charles Wardell Stiles and Albert Hassall, and was issued July 11, 1896. The account and figures of this tapeworm, however, are copied from an earlier publication by R. Blanchard, 1891, in the *Mémoires de la Société Zoologique de France*, volume 4. At the date on which Stiles and Hassall wrote, this cestode had not been recorded from the United States. But in the "Tænioid Cestodes of North American Birds," Bulletin 69, United States National Museum, 1909, page 68, Ransom mentions, in a footnote, that *Davainea proglottina* has been collected in Pennsylvania and Maryland.

It is not to be doubted that this helminthiasis is widespread in America, and since it is obviously dangerous, it has been considered advisable to give the clinical symptoms, as these are described in a paper by Lucet, entitled "Entérite vermineuse

[1] Contribution from the Bureau of Animal Industry of the Pennsylvania Department of Agriculture. New Series No. 8.

des poules," in the *Recueil de Médecine Vétérinaire,* vol. 65, page 312, 1888. This will permit American poultrymen to recognize the disease when it breaks out, and to take the measures necessary to check its ravages.

Lucet reports two outbreaks of this disease amongst poultry. He states that while at the outset of the attack the birds eat well, they gradually waste away and become lethargic. This condition is followed by more obvious symptoms. The feathers become dull, dry and ruffled up, the wings are drooped, progression is languid, breathing rapid, and the birds no longer run away at the approach of a stranger.

As the emaciation becomes more accentuated there is a fetid diarrhea, the appetite becomes less regular and the rectal temperature falls. Dullness and somnolence become more and more evident, the birds hump up the back and remain for hours in the same position and same place, with the eyes half closed. When they move the gait is staggering and painful, and they are easily caught. The plumage grows duller and dryer, lice become abundant, the crest and mucous membranes grow pale, and finally the appetite is completely lost. In this stage the sick birds yawn frequently, find difficulty in holding themselves upright, and if they fall, are able to regain their feet only with difficulty. A complete torpor finally takes possession of them, and they die without the least evidence of shock. The duration is from one and a half to two months.

At death the emaciation is such that birds may be reduced to one-fourth of what would be a normal weight.

At autopsy, besides the emaciation, conspicuous symptoms are a thickened mucous membrane of the intestine, which may be flecked with red, and the presence of a great quantity of mucus, which tends to be fetid.

In eighteen birds which Lucet autopsied, he found *Davainea proglottina* present in all, in thousands.

With regard to the tapeworm itself, a detailed account is given by Stiles and Hassall in the paper referred to above. According to this the entire worm is from 0.5 to 1.55 mm. long by 0.18 to 0.5 mm. wide. Hence even the largest specimens are only about one-sixteenth of an inch long, and it is easily seen that they may be overlooked unless the microscope is used.

Following the same account, the head is 140 to 250 microns

long by 135 to 200 microns wide. Behind it is often constricted to form a neck. There is a rostrum, the dimensions of which vary according to its state of expansion or retraction. At its base it is armed with a row of from 80 to 90 hooks, 6.5 to 7.5 microns long. The suckers are circular and small, from 25 to 36 microns in diameter, and each is furnished with a single row of hooks, 6 microns long.

The chain is composed of from two to five segments, the first of which is very small, those following becoming rapidly longer and broader. The genital pores are irregularly alternate, and situated in the anterior angles.

The conditions within the segments are noteworthy. In the second the male organs are well developed, the female rudimentary. In the third segment the testes are atrophied, while the female organs are fully developed, except that there is no uterus. In the fourth segment all of the genital organs are atrophied and the entire segment is filled with eggs, which are from 35 to 40 microns in diameter.

The segments have a great tendency to separate, and after doing so may remain in the intestine and gain dimensions of 2.0 by 1.25 mm. or larger than the entire worm.

The intermediate hosts are stated to be *Limax cinereus, L. agrestis* and *L. variegatus.* The valid names of these three species of slugs are now *Limax maximus, L. agrestis* and *L. flavus.* Although European species, they are all abundant in the United States. *L. maximus* and *L. flavus* are our two commonest large slugs; *L. agrestis* the common small gray slug. Since chickens will without doubt eat any or all of these slugs, there is plenty of opportunity for the bladderworm stage of the parasite to be transferred.

On December 17, 1921, the laboratory of the Pennsylvania Bureau of Animal Industry received four chickens, one dead, three alive. The dead chicken, which was apparently also suffering from roup, showed a severe hemorrhagic enteritis and a large number of small tapeworms. One of the living chickens was then killed and the same conditions were observed at autopsy.

It was unfortunately impossible to obtain a clinical history of these cases, and the second chicken used in the study was unfortunately killed before any clinical observations were made.

The very clear evidence which Lucet furnishes, however, as to the pathogenic effects of *Davainea proglottina*, taken in connection with the diseased state of the intestine found at autopsy, appears to warrant the conclusion that this tapeworm was at least partly responsible for the conditions of which the poultryman complained.

The two remaining birds, since maintained at the laboratory, are not conspicuously ill, but are being kept in the hopes that they will yield material for inoculation of the intermediate hosts.

The intestinal mucus of the bird which was sacrificed was found to contain three species of tapeworm. These were *Davainea proglottina*, *Amoebotaenia sphenoides* and *Hymenolepis carioca*. The latter two were, however, quite scarce, and may be dismissed from consideration.

With regard, however, to *Davainea proglottina*, in nearly all of the microscopical mounts there were from one to several worms. A mount consisted of only enough mucus to be covered by a seven-eighths inch cover glass. It may therefore be presumed that there were thousands of the worms present in the entire intestine.

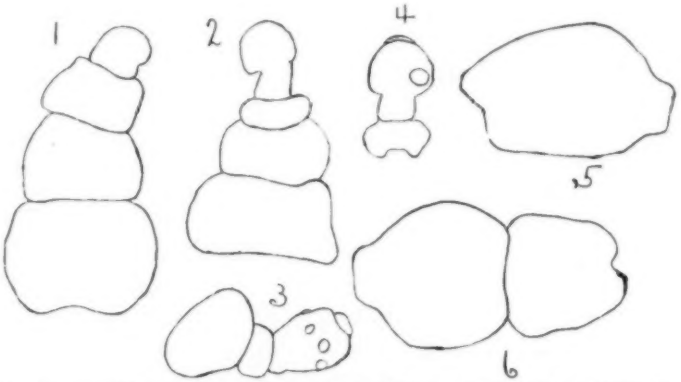
The findings consisted of heads with one or more segments, chains of two or more segments without heads, and single segments. (See figures.) The longest chain found consisted of a head and three segments. It is stated in the literature that the segments are readily detached from the chains, and this was evident from the material examined, for not only were there a great number of free segments, but in many cases the chains themselves were but loosely attached together.

The head (figures 2 and 4) usually was made up of two parts, a broad, rounded anterior portion, and a much narrower posterior portion, which forms at times a very short neck. In some cases this "neck" is as long as or longer than it is broad; in others it is reduced to a narrow transverse strip. In many of the worms, however, this distinction between the anterior and posterior parts of the head is not in evidence (figures 1 and 3).

In six heads measured, the lengths, including the "neck," varies from 186 to 310 microns, the breadth from 150 to 180 microns. These figures are roughly in accord with those given

by Stiles and Hassall, which refer to European specimens of the worm.

The longest chain seen, which consisted of head and three segments, was a trifle less than a millimeter long, and about 420 microns wide at its widest portion. In the chains (figures 1 and 2) the segments were almost always wider than long, there being here a certain discrepancy between the condition as I found it and that figured by Stiles and Hassall.



Camera outlines of Davainea proglottina. The chain shown in Fig 1 was 0.8 mm. long.

The segments occurring either singly, or, as it often happened, in pairs, reached a larger size than those in the complete chains. They were, moreover, often longer than broad. Figure 6 shows a pair, the segments of which measured respectively 312 and 314 microns, and 413 by 413 microns. The segment shown in figure 5 was 578 microns long by 363 microns wide.

Although the present paper can not be regarded as making any very original contributions to the science of helminthology, it is believed it may be of value in calling the attention of the poultryman and veterinarian to a condition which may and probably does work harm to the poultry industry of the United States. Where fowls are found to be afflicted with a severe enteritis, parasites, either roundworms or tapeworms, should at once be suspected and should be looked for with the aid of the microscope. It can scarcely be questioned that *Davainea proglottina* and *Capillaria* are widely distributed in the United States, but owing to the small size of both of these worms it is readily seen that the microscope is necessary to detect their presence. The microscope, however, is rarely used in routine

autopsies, and in consequence the worms are almost certain to be overlooked. In consequence, the enteritis which they cause will either be left unexplained or credited to some other cause, and as a result the proper remedial measures will not be applied

---

Dr. B. H. Ransom, Chief of the Zoological Division, Bureau of Animal Industry, will attend the combined short course for veterinarians and meeting of the Minnesota State Veterinary Association, which is to be held July 12 to 14 at University Farm, St. Paul, Minnesota. Dr. Ransom will deliver one lecture on parasites that affect livestock, and another on the general work of the Bureau.

Upon the death of Dr. C. B. Robinson, who was veterinarian for the city of Washington for a period of thirty years, the position was accepted by Dr. Frederick Grenfell, M. R. C. V. S., one of the oldest practitioners in the District of Columbia.

Mrs. May C. Clark of Springfield, Mass., recently announced the engagement of her daughter, Miss Doris Jane Clark, to Dr. Ralph W. E. Daniels.

Dr. L. A. Klein discussed the subject of "The Sanitary Production of Milk" with the city commissioners, milk dealers, milk producers and others interested, at Corry, Pa., on March 31.

Commissioner H. H. Halladay, well and favorably known to most of our readers, has resigned as State Commissioner of Agriculture for Michigan to become Secretary of the Michigan Agricultural College. The change was effective on April 1, the same day that Professor David Friday formally took over the presidency of that college.

Dr. Frederick Torrance and Col. Sharman, of the Canadian Health of Animals Branch, spent several days in Washington, D. C., last month conferring with officials of the Bureau of Animal Industry.

ENTEROCLYSIS [1]

By WILLIAM J. LENTZ
School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa.

ENTEROCLYSIS, or the flushing out of the bowel by means of large and slowly injected clysters, is one of the most valuable therapeutic measures we possess. It is not my purpose to enumerate the diseases and conditions in which I feel it is indicated as a part of the routine treatment, but rather to consider the subject in a general way. Some of the following facts bearing on enteroclysis have been proved by actual experiment at the Veterinary School of the University of Pennsylvania.

Enteroclysis is of value for medicating or cleansing the large intestine; for the maintenance of bodily heat by the use of hot water; for the reduction of fever by the use of cold water; an absolutely safe method for combating circulatory failure; for stimulating kidney secretion, thus promoting elimination of poisons; induces intestinal absorption of water when the body craves it; dilutes the poisons manufactured by the germs of disease; prevents collapse; washes from the body various impurities circulating in the blood and lymph; supplies the body with liquid when the stomach will not permit the liquid to be swallowed; frequently aids in the diagnosis of intestinal parasitism; a means by which, in the dog, it is sometimes possible to remove foreign bodies, by way of the mouth, from the intestines, stomach, esophagus and throat; primarily indicated in intestinal obstructions and fecal impactions.

The advantage of enteroclysis over venous infusion in septic conditions lies in its safety. When the heart muscle is weakened by septic and febrile processes it is dangerous to increase suddenly the blood pressure. The absorption of fluids from the intestine can only be slow and gradual and no more can be absorbed than the organism craves. No matter how far the liquid penetrates, the entire gut may profit by the lavage by bringing down the contents from the small intestine, as the value of irrigation depends somewhat upon the absorption of water by the large intestine.

[1] Presented at the thirty-ninth annual meeting of the Pennsylvania State Veterinary Medical Association, Harrisburg, Pa., January 24 and 25, 1922.

The best apparatus for bowel irrigation in the dog is a long, flexible tube and a fountain or gravity syringe. In the horse, a one-half or three-quarter inch flexible rubber tube, esophageal tube or garden hose attached to a bucket or tank of sufficient size so that the flow will be constant, not intermittent. In cities or towns the attachment may be made to a forced water supply.

When it is desired to cause liquids to pass forward to any extent it has been found that any kind of forced hand syringe is, as a rule, of little value, because the fluid is injected with a jerking instead of a constant flow; and furthermore, the pressure at the start of the injection should be so slight that the flow would amount to hardly more than a trickle, increasing the pressure as the resistance of the bowel is overcome by simply elevating the container or turning on the tap further.

Liquids exert pressure uniformly in all directions. In the gravity syringe the liquid is urged on by the hydrostatic pressure which is exerted uniformly in all directions irrespective of the caliber of the tube; therefore the diameter of the tube makes no difference other than that the liquid flows more rapidly with a tube of greater diameter. The fountain syringe held at the height of one foot represents approximately one-half pound pressure to the square inch. It has been asserted that pressure in excess of eight pounds to the square inch may bring about rupture of the peritoneal coat of the bowel. We have experimentally exceeded this pressure in both the horse and the dog without such a result. Frequently in the dog a pressure of but two pounds will cause the liquid to pass the ileo-cecal valve, thence into the stomach and then from the mouth, because the ileo-cecal valve is not very efficient in this animal. A pressure in excess of eight pounds is dangerous, particularly if any disease of the bowel exists, and we have been able to show, in the dog, on a number of occasions minute points of hemorrhage of the bowel when pressure even under eight pounds is used, and when too rapidly and forcibly made. There is also grave danger of collapse at times.

Bowel irrigation to be effective should always consume considerable time. Frequently repeated forcible injections, using small amounts of water, simply tend to produce spasm of the bowel. An interval of from four to eight hours should elapse before the second irrigation is attempted.

The amount of liquid employed is not to be measured by quarts but by results. In puppies, in particular, the best guide as to the amount which has been introduced is the tension of the abdominal walls. I take this opportunity to call attention to a case of intussusception in a puppy which was relieved by enteroclysis, the diagnosis having been established by laparotomy.

The temperature of the liquid injected, in most instances, should be about 100 degrees to 110 degrees F. Cold irrigations have a tendency to depress the heart and may produce dangerous chilling of the internal organs. If water at a temperature of 65 degrees F. is used it will bring about a fall in the bodily temperature of from one and one-half to three degrees in fifteen to thirty minutes. It is therefore indicated at this temperature to reduce fever. If the temperature of the water is too high there is danger of heat stroke. A temperature of 115 degrees F. will cause a rise of from three to four degrees in from twenty to thirty minutes, and injections at this temperature are frequently given to patients brought to us with a subnormal temperature.

There is always danger, when large injections of water are used, that the vital salts may be abstracted from the intestinal wall; the liquid, as a result of osmosis, passing into the tissues thus in a sense drowning them; therefore, to guard against this it is always advisable when possible to use a normal saline solution, 1 dram to the pint. Water in itself is irritating to the bowel.

With the idea of ascertaining how far liquids could be made to pass forward in the horse, a number of experiments, using methylene blue injections, were undertaken, the animals being destroyed afterwards. In general, our findings corroborate those of Reek in his work on "Colics of the Horse," to which I would refer you for the technic employed in obstruction colic. The experiments proved to us rather conclusively that the irrigations as usually carried out by the busy practitioner, or the layman, with forced hand-pumps or other inadequate apparatus, an insufficient amount of water, an intermittent flow, too great pressure at the beginning, too short a time devoted to making the injection, etc., can not be very effectual in breaking down impacted feces at the usual seat in impaction colic—that is, the

terminal part of the folded or large colon. Usually such irrigations seem to embrace but four to five feet of the floating or small colon, even when, in one instance, for example, the animal received three ounces of chloral in advance, so as to simulate a case of impaction colic. In one experiment the animal received a purge some twelve hours before the injection was made. A large amount of liquid was retained, the time consumed being about fifteen minutes; and it was found, in this case, to have passed into the folded or large colon as far forward as the pelvic flexor.

Several facts in these experiments worth recording are: That the liquid will pass farther forward if the lower bowel is empty; that it is advisable to have the posterior part of the body elevated, the higher the better; that it takes more than twice as long to make the injection with cold water as when water at body temperature is used; that there appears to be less straining, consequently more liquid retained, when salt in proper amount to make a normal saline solution, or Epsom salt in five to ten per cent solution, is added to the water.

Medication of the bowel, particularly of the dog, or, in other words, treating the intestinal mucosa by rectal injection, sometimes gives very gratifying results in many cases of diarrhea, intestinal coccidiosis (previously reported on in intestinal coccidiosis in cattle, which responded to this line of treatment), proctitis, inflammation of the prostate, etc. One of the best solutions to employ is tannic acid in the proportion of 1 to 5 drams in 2 quarts of water, with about an ounce of tincture of opium, boric acid, or bicarbonate of soda. As a matter of fact the passage of mere normal salt solution over the bowel is of value to remove the mucus and pus and dilute the toxic albuminoids produced by the microorganisms. It is asserted that tannic acid inhibits the growth of intestinal germs. Nitrate of silver injections of the strength of 10 to 20 grains to the pint of water is often efficient in old and chronic ulcers of the bowel. This should be followed by a saline solution to limit the action of the silver. Boric acid solution is employed in the proportion of one dram to the pint of water.

I can not leave this subject without calling attention to nutrient enemata. Recent investigations have proved conclusively that injections of foodstuffs per rectum for the purpose of main-

taining nutrition have but little value, the solids remaining in the bowel, only the liquids being absorbed, and these are of no value whatsoever unless first predigested. To a well-beaten egg and milk a peptonizing tablet or contents of a peptonizing tube must be added. The addition of whisky or wine will increase the effect. Five ounces of scraped meat suspended in 3 ounces of lukewarm water to which is added a peptonizing or pancreatic tablet may be employed. Milk, 2 ounces; strong beef tea, 2 ounces; yolk of 1 egg, 1 peptonizing tablet.

A nutrient enema should be given warm and slowly. The effect may be increased by the addition of whisky or wine. It should not be given more frequently than every six hours, as the rectum is apt to become irritable. The same mixture should not be repeated too often.

Dr. J. L. Masson, formerly of Myrtle Point, Oregon, is now located at Eureke, Calif., where he will continue the practice of his profession.

Dr. D. W. McAhren, Sioux City, Iowa, Dr. Robert Rives, East St. Louis, Ill., S. M. Magowan, Fort Dodge, Iowa, S. F. Cusack, Sioux City, Iowa, G. H. Williams, Omaha, Nebr., and Edw. M. Boddington, Kansas City, Kans., were recent visitors at the National Capital, where they conferred with Government officials on subjects of mutual interest, as a committee of the Associated Serum Companies.

British farmers, it is said, are abandoning the motor tractors and trucks that they bought during the war, and are reverting to the use of horses. The secretary of the National Farmers' Union is quoted as saying that farmers are looking forward to a general return to the horse-drawn heavy vehicle and an early revival of the horse-breeding industry.

BACILLUS BOTULINUS IN SWINE DISEASES

By ROBERT GRAHAM
Laboratory of Animal Pathology and Hygiene, University of Illinois

THE PRESENCE of *Bacillus botulinus* as a secondary invader in swine diseases and the possibility of its being a factor in the immunization of swine against hog cholera as the result of contaminated serum or virus was reported in the October (1921) issue of the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. Since the above preliminary report the writer has had an opportunity to continue these investigations with special reference to the anaerobic flora in the internal organs and intestinal tract of swine affected with cholera ten to ninety days following immunization with serum and virus, as well as to examine certain samples of serum and virus secured at random from manufacturers of serum, for the presence of heat-resisting, spore-forming organisms.

In two afflicted herds referred to the laboratory since the original report the presence of *B. botulinus*, type A, has been encountered in the intestinal tract and internal organs of swine which suffered from cholera following the injection of serum and virus. Notwithstanding the relative resistance possessed by mature swine to the botulinus organism the specific toxic character of the A-type botulinus toxin in pigs has been observed in experimental animals following the injection of broth cultures. The syndrome of an acute intoxication is typical and easily recognized, yet the subacute or chronic type of the disease, as clinically observed in experimental pigs, is marked by debility and unthrift.

Since the original report relative to the positive bacterioloical findings in serum and virus, negative results have been encountered in approximately 100 samples of commercial serum and virus as secured in the open market and it appears that botulinus intoxication in swine as a specific factor in "breaks" may not be as significantly related to the contaminated serum and virus used in immunizing the herd as inferred in the earlier part of our studies.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

OSSIFYING PERIOSTITIS IN A BULL

By LEE M. RODERICK

North Dakota Agricultural Experiment Station, Agricultural College, North Dakota

CASUAL REFERENCES in the literature as well as the experience of practicing veterinarians indicate that conditions involving the stifle and the bones there articulating are occasionally observed in cattle. That such affections are of especial significance in valuable breeding animals and particularly in bulls is quite apparent. This article is not concerned with a clinical discussion of the condition, but rather with a general pathological study of the bones involved in a case of about three years' duration. It is hoped that these general observations may have some worth as an indication for the care and treatment of such animals.

History.—The affected bull was of the beef type, seven years of age, had at all times been well fed and cared for, and had been lame in both hind legs for about three years. The left stifle was the more sensitive and the left leg was always a little larger at times of greatest lameness. There was no evidence of heat, although pain could be induced in the region of the external ligament. There is no obtainable history of external trauma or mechanical injury. Treatment in the latter stages has included salicylates, potassium iodide, and colchicum combined with local hot applications.

The question of exercise in similar conditions may be worthy of consideration. This animal had at one time run in the pasture for a period of about three months and in the meantime had become greatly emaciated, yet the feed was never insufficient. The owners were then prevailed to place the animal in a well-bedded box stall, and following such treatment as given, some improvement was obtained. The animal later fell while in the act of service, and inasmuch as prognosis appeared very unfavorable as the result of some undetermined injury, the bull was accordingly destroyed.

The clinical observations concerned in this case are the work of Dr. H. C. Vestal, Page, N. Dak. He found the joint capsule to be hyperemic and the synovial fluid of a dirty reddish brown color. The femur and tibia were removed and boiled to remove adherent tissues, and were then submitted to this laboratory. The bony fragments shown in the illustration were loose after the bones were boiled, and since care was exercised

Stifle Joint of Bull

in handling to avoid injury, it is probable that they were at least only loosely attached.

Examination of the femur shows the presence of extensive superficial bone lesions. These consist of irregular porous masses, plates and spicules termed osteophytes which in places attain the thickness of a centimeter. The prominent prolifera-

tive changes involve the trocanter major, the distal portion of the shaft, where the changes are the most marked, and the distal extremity. With the exception of the internal condyle there is little involvement of the articular surfaces except at the borders. Section of the femur did not reveal any evidence of a rarefying osteitis. Except for the extensive superficial lesions, the bony structure appears normal.

The lateral borders of the patella exhibit coarse osteophytes, yet the articular surface is but little injured. The anterior surface is roughened to a marked degree.

The periostitis appears to have been confined mainly to the shaft of the tibia and to have involved the proximal portion more severely. The medial surface is greatly roughened by the presence of numerous osteophytes. The posterior surface was but little involved except adjacent to the proximal extremity. The proximal extremity presents numerous roughened protuberances about the borders of the condyles. The pathological condition has made some encroachment on the articular surface, but more especially on the medial border. The intercondyloid fossæ and the proximal head of the fibula show additional bony masses.

Examination of these bones indicates that they have been affected with a generalized periostitis which was most severe adjacent to the stifle joint. The ossified lesions confirm the chronicity of the condition. Chronic periotitis often becomes proliferative in nature, resulting in the formation of new bone from the inner layers of the periosteum. The histological process of such bone formation is similar to that normally developed, but because the blood vessels are irregularly arranged, as in the formation of granulation tissue, and subject to various mechanical and nutritive changes, the new bone is not regularly arranged in lamellæ but in irregular masses.

PUSSY'S PERILS

By E. A. WESTON
Rubiaco, Western Australia

MY FIRST INTRODUCTION to Pussy was when she started to call tentatively. She was very thin, evidently finding the world a tough place to get a living in, but she had an ingratiat-

ing manner and was evidently a good judge of character, as she made herself specially pleasant to my wife, who is a great lover of animals. Finding she had struck a good home, she finally settled down here permanently, much to my annoyance, as there was every indication of an increase in the feline population. I stipulated that my wife should do the bloody deed when the kittens arrived, but needless to say it fell to my lot, and I drowned four out of the five new arrivals.

Nine days after the birth of this lot, Pussy went on the razzle-dazzle again, and got a fresh lot under way. As it looked to me as though the supply was likely to largely exceed the demand, I decided that Pussy should have her ovaries out. However, I had to wait until No. 1 kitten was ready to wean, and by this time Pussy was half gone in pregnancy again. Having been out of practice for some years owing to invalidity, I took my patient along to Mr. T. Dewhirst of this city (Perth, Western Australia), and we operated on her in his hospital.

The day previous to the operation I shaved and disinfected the abdomen, and it was painted with iodine while the patient was on the table. For an anesthetic we gave one-quarter grain morphia hypodermically, followed by chloroform. I had shut Pussy up on the morning of the operation, and on opening her up we found that this was a great mistake, as her bladder was very distended and obscured the field of operation. However, under chloroform the sphincter relaxed, and we were able to go ahead. The uterus contained four fetuses, and of course there was the usual muscular and circulatory development accompanying pregnancy. The ovaries were removed without difficulty, and a small lateral from the main uterine vein, which was bleeding freely, secured and ligatured. Following this the abdominal wound was stitched, the muscles and peritoneum with a continuous gut, and the skin with interrupted silk sutures. Pussy was put back in her box and brought home in the trap.

The following day she was moved out into the garden under a portable chicken coop. She immediately got out of her basket and emptied her bowels, following which she dozed all day. The second day signs of abortion, in the form of a bloody oozing from the vagina, appeared, and on the third day increased. I passed a finger into the vagina to try to find out what was

happening, but Pussy yelled blue murder, and struggled so violently that I had to desist, fearing she would burst the abdominal wound open. On the fourth day Pussy drank some milk, and aborted four kittens with their membranes. Two came away in the morning, but she held the others until she was let out, and allowed to go and scratch a hole in her usual spot in the yard. The following day I syringed her out with a bit of rubber tube on the end of a 10 c.c. hypodermic syringe, and I used this occasionally for some time thereafter. She drank some milk, cleaned herself, and seemed bright, although very weak.

During the next three days signs of septicemia were present, the patient refusing to touch either food or drink of any kind, and getting very weak. She was, however, surprisingly bright, and on the ninth day my wife, who had taken a great interest in her protégé, started feeding her with egg and milk. Within a few days her condition began to improve, and she made an uninterrupted recovery, and ate her first solid food eleven days after the operation. On the seventeenth day her kitten started sucking her again, although it had been nearly weaned before the operation. It continued sucking her up to a few days ago, a period of nearly three months since the operation. The abdominal wound never gave any trouble, and healed by primary adhesion.

I have recorded this case because it stresses the importance of placing an animal like the dog or cat under natural conditions prior to and succeeding operation. Had Pussy been shut up in a strange place there is no doubt she would have refused to pass either urine or feces until compelled to do so, and would also have retained the dead fetuses until the last moment. This would most probably have resulted fatally, despite the actual operation having been successfully performed.

OVERLOADING OF HORSE'S BOWELS WITH CORN [1]

By R. A. DEAN
St. Peter, Minnesota

A BAY GELDING, ten years old, running loose in the yard, broke into the corn crib during the night and ate between 60

[1] Presented at the annual meeting of the Minnesota Veterinary Medical Association, St. Paul, Minn., January 13-14, 1922.

and 100 ears of corn. He was found sick by the owner in the morning and the broken corn crib discovered. Ward's liniment was given and the dose repeated. This did not seem to help, and I was called.

I saw the patient at 11 a. m. As I got out of my car I spied the patient rolling out in the yard near the straw pile. When I got over to it I found him in great distress; food coming from nostrils; respiration fast and jerky; conguntiva inflamed; pulse bounding; ears and legs warm; temperature 102; abdomen greatly enlarged from gas and food. I at once passed a trocar, and a lot of gas escaped, but the swollen abdomen did not go back to normal, nor anywhere near normal, so I knew it was the solid or semisolid fermenting mass that I would have to get rid of. I administered physic, one ounce of salicylic acid in a capsule, and massaged the bowel per rectum.

There had been, the owner said, and were now, free fecal passages. The animal was now somewhat relieved and stood on its feet, occasionally pawing and looking around at its right side. I administered a second capsule of salicylic acid and left choral hydrate to be given every hour until I could see the case again, which I did at 3:30 p. m.

I found the animal up but still in some distress. Administered another dose of physic and put him on nux vomica and gentian after giving salicylic acid and again massaging bowel. Left instructions to call me if he needed me again, and left the place, thinking the horse could not recover.

I saw the owner's neighbor the next day, who informed me that the horse was still up and doing better, but that he would not eat. Two days later I learned that owner had driven the horse to town.

I cite this case in view of the controversy recently in *Veterinary Medicine* waged between Drs. Quitman and DeVine regarding the use of salicylic acid and the stomach tube. I did not use the stomach tube in this case because the ingesta, or at least most of them, had passed from the stomach, and therefore flushing of the stomach could do no good. I did not have much faith in what medicine could do for this horse, either, but gave what I considered the rational treatment, and, as I said before, was surprised at the results because I thought it a case of sure death, and from the owner's talk I think he did, too.

I do not believe the stomach tube is indicated in any cases except gastric tympany and gastric engorgement (except, of course, poisoning). In fact, the stomach tube is the only remedy that will save a case of stomach overloading or engorgement, and Dr. Quitman's salicylic acid and any and all other medicaments are absolutely of no avail whatsoever for this reason: Medicine would never get a chance to act, for to pour medicine into an impacted mass in the stomach would be like pouring it into a sack full of bran; it would soak down a little way into the mass and never reach the sides at all. This is the only case where a stomach tube is absolutely needed to effect a cure, so, while perhaps a common country practitioner is taking a lot upon himself to criticize such men as these, I believe they are both right to a certain extent and wrong the rest of the way, if you know what I mean.

We have a fine list of colic remedies which, with rectal massage, will relieve other colics that are susceptible to any treatment.

CÆSARIAN OPERATION ON A BITCH [1]

By R. A. DEAN
St. Peter, Minnesota

A CÆSARIAN OPERATION, with delivery of fetus by cutting through the walls of the abdomen, was performed by me November 26, 1921, after all other means of delivery had failed, on a registered Boston bull terrier bitch of much value.

The animal was anesthetized with chloroform and ether (2 of ether, 1 of chloroform). The field, the right flank, was clipped, shaved and sterilized. The incision through skin, muscles and peritoneum was made, exposing the uterus. All bleeding was checked and the uterus was carefully taken out and laid in sterile gauze. An opening was made in the left horn and two live puppies were extracted, the last one giving great trouble owing to the fact that its head was pressed firmly into the pelvic opening.

There was quite a little bleeding from the uterus, which

[1] Presented at the annual meeting of the Minnesota Veterinary Medical Association, St. Paul, Minn., January 13-14, 1922.

took some time to check, and part of the afterbirth did not come away. This was left.

The edges of the uterus were inverted and sewed with an uninterrupted catgut suture to the other end of the wound and back again to the starting point, where it was tied, the suture penetrating only serous and muscle coat. The peritoneum was then sutured with interrupted catgut; the muscles and skin with interrupted linen. The walls of the vagina were then painted with 1-1,000 adrenalin solution and two suppositories of capsule containing two-thirds boric acid and one-third iodoform placed therein.

This treatment was repeated once a day for three days, during which time the mother was very sick, beginning to improve on fourth day, from which time on she made an uneventful recovery.

The puppy which had been stuck within the pelvic opening died the third day from swelling of its jaws, due to wounds made by instruments first used in delivery to such an extent that it could not take sufficient nourishment. The other puppy lived and was sold for $40. The mother has since given birth to a litter of pups.

I cite this case to show the value of actual surgical demonstrations at our meetings, as I learned this technic from Dr. Gould's demonstration on a sow two years ago at University Farm. I have also saved several sows with this technic.

A committee has been appointed to erect a monument at Lyons, France, to the late Prof. J. B. A. Chauveau, a famous French scientist and authority on comparative medicine, who died five years ago in his ninetieth year.

The French National Syndicate of Veterinarians has adopted an official label or stamp to be used on approved products. The design bears a portrait of Bourgelat, the father of modern veterinary science. The proceeds are to be applied toward a home for needy retired veterinarians. The Syndicate has voted to continue for another year its aid to veterinarians in the devastated regions.

ABSTRACTS

CONTRIBUTION TO THE ETIOLOGY AND VACCINOTHERAPY OF CANINE DISTEMPER. Mazzucchi. Clinica Veterinaria, nos. 13 and 14, 1921. Abst. in Rev. Gén. de Méd. Vét., vol. 31 (1922), no. 362, p. 78.

After many bacteriologic examinations with negative results in cases of dog distemper, Mazzucchi isolated a cocco-bacillus from the liver of a dog showing clinical symptoms of the disease, which possessed characters very similar to those of the organism found and described by others in cases of the disease (*B. bronchisepticus*).

He inoculated 5 dogs intravenously and subcutaneously with two loops of a broth culture of the organism; all animals developed the same clinical symptoms as occur in the natural infection—*i. e.*, fever, cough, watery eyes, and after several days pustules on the inner aspect of the thighs. A small dog which was living with these animals contracted the same disease.

Two dogs inoculated with the same germ, together with streptococci and staphylococci, showed the same clinical picture but with more marked symptoms. Autopsy revealed the same lesions as those found in the natural infection. The author did not look for the cellular inclusions described by Lenz and Sinagallia. Streptococci and staphylococci which are frequently found in the different secretions of the sick animal without doubt play a very important part in the production of secondary lesions.

He prepared a polyvalent vaccine with a view to testing its therapeutic action. The results were negative in dogs affected with the nervous form of distemper, no doubt because there already existed anatomic lesions.

In the beginning of the disease the injection of the vaccine in a dose of 2 c.c. prevents the appearance of cutaneous lesions. When the symptoms persist, the injections may be repeated two or three times at an interval of 2 or 3 days.

The encouraging results obtained in the treatment should recommend the use of the vaccine in the prophylaxis of the infection.

L. T. GILTNER.

THE FORMATION OF ANTIBODIES FOLLOWING INJECTIONS OF MALLEIN. Brocq-Rousseu, P. Forgeot and A. Urbain. Annales de l'Institut Pasteur, vol. 35 (1921), No. 12, p. 879.

From experiments on ten normal horses and two glandered horses the authors formulate the following conclusions: 1. The intradermic injection of one-tenth c.c. mallein (1:4) repeated four times at regular intervals caused the formation of antibodies in only two out of five cases, or 40 per cent. 2. The first subcutaneous injection of two and one-half c.c. mallein (1:10) caused antibodies to appear in the blood of four out of five horses, or 80 per cent. After a second injection antibodies appeared in all cases. 3. The horses in which antibodies were not demonstrated after four successive palpebral malleinizations did show them four days after a subcutaneous injection of mallein. The dose of mallein injected subcutaneously was ten times greater than that of the first (intradermic) injections. 4. The antibodies formed in the organism after either the intradermic or subcutaneous malleinization appear from the fourth to the eighth day after the injection of mallein. They all disappear after the forty-fifth day. 5. In glandered animals the amount of antibodies in the serum is notably increased after injection of mallein.

From a practical point of view the following conclusions are drawn: If the complement fixation test is to be used in connection with mallein for the diagnosis of glanders blood ought to be drawn immediately after malleinization and in any event before the fourth day or at least 45 days after injection of mallein. Obviously, the blood should be drawn the day before the injection of mallein; but it may be taken the day after in case the mallein test should give a doubtful reaction; generally such reactions necessitate a fixation test. L. T. GILTNER.

THE IMPORTANCE OF THE DOMESTIC ANIMALS IN THE SPREAD OF TUBERCULOSIS. Lydia Rabinowitsch-Kempner. Zeitschr. f. Tuberkulose, vol. 34 (1921), no. 7, p. 570.

In the transmission of tuberculosis, the infection from one person to another is of most frequent occurrence. Cattle are next in importance, as the studies of the last 20 years have shown that bovine tuberculosis in children is by no means inconsider-

able. The dog and cat as intermediate carriers of tuberculosis infection constitute a danger to the health of man which must not be estimated too lightly. Besides these animals, swine are frequently affected with tuberculosis. The other domestic animals, such as the horse, ass, sheep, rabbit and guinea-pig, are only rarely affected with the disease, even when they come in contact with tuberculous humans and cattle. The parrot and canary bird are not only susceptible to the avian germ, but also to the human and bovine bacilli.

In the years 1913-14, Jost autopsied 4,683 dogs and 933 cats at a Berlin rendering works. Of the former 75, or 1.6 per cent, were found tuberculous; no dog under 2 years old was tuberculous and the highest percentage of infected animals was found in those aged from 5 to 10 years. Of the latter class of animals 110, or 11 per cent, were tuberculous; the most cases were found in the cats ranging from 4 to 6 years.

In 1920-21 Jost examined 771 dogs and 34 cats. Suspected tuberculous material from the animals was turned over to Rabinowitsch, who made bacteriologic examinations, with the following results: 19 strains of tubercle bacilli (2.4 per cent) were isolated from the dogs. Of these strains 16 were human, 1 bovine and 2 atypical. 5 strains (14.7 per cent) were recovered from the cats, 3 human and 2 bovine. Two specimens of goat lung were also examined, bovine bacilli being recovered from 1 case and no tubercle bacilli from the other.

From the above figures the author concludes that tuberculosis in both the dog and cat is decidedly on the increase.

L. T. GILTNER.

PREPARATION OF BRAXY VACCINE. M. Christiansen. Den Kongelige Veterinaer Og Landbohojskole Aarsskrift, 1921, p. 75.

Braxy vaccine consists of a mixture of braxy spores and braxy immune serum so standardized that each dose for a sheep contains a surely fatal dose of braxy spores for a 250-300 gm. guinea-pig (usually 8 mgms.) and an amount of immune serum not quite sufficient to neutralize the virus. The immune serum is prepared by inoculating horses intravenously with increasing doses of fresh broth culture of the braxy bacillus (*B. gastromycosis ovis*). The serum is exsiccated and pulverized and

in this condition it will retain its potency for years. The braxy spores are obtained by cultivating the organism in a medium composed of equal parts of glucose-free broth and sterile normal horse serum at 37 degrees C. under anaerobic conditions (hydrogen). After two weeks incubation the cultures which then contain large quantities of spores are dried and pulverized and as such are used for the vaccine.

During the past 10 years the vaccine has been used each year on from 200,000 to 250,000 sheep in Iceland and on about 10,000 sheep in Faroe islands with satisfactory results.

L. T. GILTNER.

A CASE OF TUBERCULOSIS IN THE GOAT. Geo. Simons. The Veterinary Journal, vol. 78 (1922), no. 1, p. 23.

A 3-year-old purebred white Anglo-Nubian goat, which had suffered no previous illness, became very dull and anemic two or three weeks after a normal parturition. There was no cough or enlargement of the superficial lymph glands. The condition gradually became worse and diarrhoea set in, becoming in a short time very profuse. The abdomen became somewhat pendulous and on the right side a peculiar lumpy condition was faintly discernible amongst the bowels. The animal failed rapidly and was destroyed. At autopsy the mesenteric lymph glands were found enlarged and softened and contained thick creamy pus. Laboratory examination of the glands showed them to be tuberculous. No other lesions of tuberculosis were found.

L. T. GILTNER.

REVIEW

DAIRY BACTERIOLOGY. Orla Jensen, Ph. D., Professor of Technical Biochemistry in the Polytechnic College, Copenhagen. Formerly Director of the Swiss Experimental Dairy Station. Translated from the Second Danish Edition, with Additions and Revisions by P. S. Arup, B. Sc. (Lond.), F. I. C., Chief Chemist to English Margarine Works (1919), Limited. Published by P. Blakiston's Son & Co., Philadelphia, 1921.

This is a book of 174 pages of subject matter, interspersed with 70 excellent illustrations. It is divided into two parts. The first part includes 53 pages dealing with a general discussion of microorganisms, their classification, biology, and method for their culture and identification. The author gives in condensed form a good general picture of microbiology and utilizes in his text only those organisms which are concerned in dairy practice.

Part 2 deals directly with milk and its products and covers practically the whole field of organisms concerned in normal and abnormal changes. Very good chapters are found on sanitary measures for handling milk, preservation of milk by pasteurization and other methods, lactic acid fermentation, normal and abnormal microflora of butter, ripening processes of the different cheeses, defects of cheese, and grading of milk.

The book should be of great assistance to the veterinarian, dairyman, and all workers with milk and dairy products. It is concise and comprehensive, containing all the essential facts of the subject and sufficient references for those who wish to go deeper into any particular matter. It represents the author's conception of the requirements for a textbook on the technic of dairy bacteriology and is based on his experiences during twenty-five years of research work. Prof. Orla Jensen is an authority on the subject and his book is a standard textbook for Danish students of dairying. It has been translated into German, Dutch and Finnish and has net with marked success.

The translator is to be congratulated for the excellent manner in which he has performed his task. The easy and not too technical construction of the text makes its reading interesting and understandable to the layman as well as the student and others associated with the dairy industry. B. A. G.

ARMY VETERINARY SERVICE

ARMY HORSE BREEDING

The World War made such a heavy drain upon the stock of horses in the United States, which supplied many thousands of animals to the American and allied armies, that all the encouragement possible should be given by the Government to plans for replenishment and improvement of breeds. The protest made by the Association of American Horse Shows against the proposal, which has been heard in Congress, for curtailment of the appropriation for the remount service of the army and the abandonment of the remount depot at Front Royal, Va., is based on sound consideration of the economic value of the work which the military establishment has been doing—a work essential not only to the army, but in the last analysis to the farming industry.

At Front Royal is located the only remount depot in the East or South, and it is highly desirable that it should be maintained. Its favorable situation renders it peculiarly adapted to the breeding of the best types of horses. It is a long-established station and represents an investment which should not be sacrificed. Of the four remount stations maintained by the army, it is probable that the depot at Fort Keogh, Mont., could best be spared, and in the interest of economy it is not unlikely that the army would agree to its abandonment, since this station is located very far North, in a part of the country where the climate is exceedingly severe for a considerable part of each year. The Front Royal depot is ideally located, and the splendid work which is being accomplished there should not be interrupted.—*Washington Post.*

Dr. R. G. Lawton, connected with the U. S. Army remount breeding work at Lexington, Ky., stopped off at the National Capital, on his way to the New England States, where he will spend his vacation.

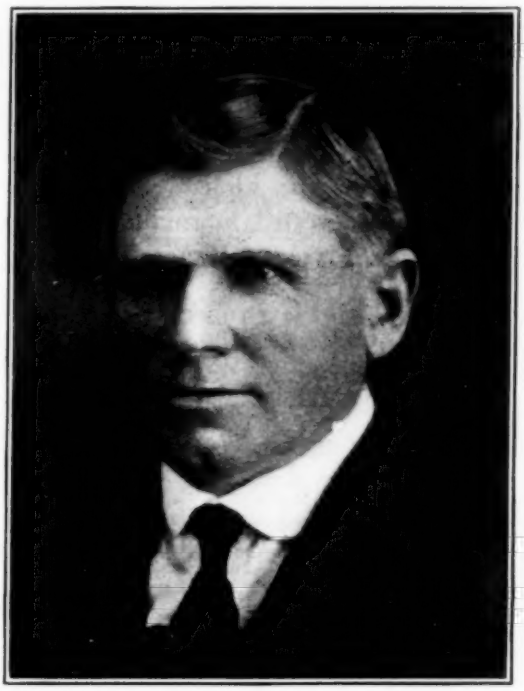
The enrollment of students in German veterinary schools is given as follows: Hanover, 387; Berlin, 276; Munich, 220; Dresden, 209; Giessen, 169.

ASSOCIATION NEWS

ANNUAL MEETING, A. V. M. A.

The fifty-ninth annual meeting of the American Veterinary Medical Association will be held at St. Louis, Mo., August 28 to September 1, 1922.

Make your plans to go.



Dr. Burton W. Conrad of Sebetha, Kansas, recently elected to the Executive Board of the A. M. V. A. to represent the Sixth District.

A. V. M. A. CLINIC AT ST. LOUIS

It has been some time since the American Veterinary Medical Association has attempted a clinic and the change in the character of practice has led to a different situation in the matter of presenting clinic before a large association. In the past attempts at clinic have been unsatisfactory because of the inability on the part of the operator or demonstrator to perform the operation in such a manner that more than a few could obtain any benefit from it.

Dr. Kinsley has realized that conditions have changed to such an extent that many factors of interest may be presented before such an organization, and an effort will be made at the St. Louis meeting to renew the practice of presenting clinics before the A. V. M. A. It is to be hoped that every practitioner will gain something from this demonstration that will repay him many times over for the time and the expense attached to attending such a meeting.

At the present time, those working upon this program are very hopeful and believe that the program as arranged will interest and please the practitioners of the Association. The following is a tentative program as it appears at this time. Minor changes or additions may be made later. A special clinic will be held for those interested in small animal practice and will be in charge of Dr. Flynn of Kansas City:

Clinic Program

First Day—Forenoon—		
8:00— 9:30	Genital Organs	Boyd
9:30—10:30	Tuberculin Reactors	Luckey
10:30—12:00	Sterility	DeVine
Afternoon—		
1:00— 2:30	Poultry	Kaupp
2:30— 3:30	Sheep	Newsom
3:30— 5:00	Parasites of Sheep and Hogs	Hall
Second Day—Forenoon—		
8:00— 9:00	Surgery of Udder	Ferguson
9:30—10:00	Cholera	Schwarze
Afternoon—		
1:00— 2:30	Tuberculous Lesions	B. A. I.
2:30— 3:00	Horses	Merillat

MICHIGAN VETERINARY MEDICAL ASSOCIATION

At our annual meeting in February our association voted to hold a summer meeting at East Lansing in conjunction with the State Department of Agriculture, the local branch of the Federal Bureau of Animal Industry and the Veterinary Department of Michigan Agricultural College. President Wurm has named the committees that are to have active charge of the arrangements for the big meeting. The chairmen of these committees are: Committee to Represent the Association, W. N. Armstrong, Concord; Committee to Represent the State Department of Agriculture, the Federal Bureau of Animal Industry, and Veterinary Department, Michigan Agricultural Col-

lege, B. J. Killham, Lansing; H. M. Newton, Lansing; F. W. Chamberlain, East Lansing; Clinic Committee, J. P. Hatton, Lansing; Entertainment Committee, O. A. Taylor, East Lansing; Ladies' Committee, Mrs. J. P. Hutton, Lansing.

A few days ago President Wurm called a joint meeting of all the committees in Detroit, and it was decided to hold the summer meeting the last three days of June. The first day is to be designated "Clinic Day," the second "Practitioners' Day" and the third "Scientific Day." The clinic committee will have charge of the program for the first day, the committee representing the association the second day, and the committee representing the State Department of Agriculture, the Federal Bureau of Animal Industry and the Veterinary Department of Michigan Agricultural College the third day.

The Entertainment Committee and the Ladies' Committee will provide the fun and frolic for the occasion. But to make the meeting a success we must have the things you are interested in. A questionnaire has therefore been sent to each member, which if filled out carefully and thoughtfully will aid the committees greatly in making up the kind of program wanted. Of course it may not be possible to get everything one desires, but we feel safe in saying that we can get what the majority want.

R. A. RUNNELLS, *Secretary.*

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Southeastern Michigan Veterinary Medical Association was held in Detroit, April 12, 1922. The members were the guests of Parke, Davis & Company. Supper was served in the company's cafe, at 5:30 p. m., after which the members were escorted to the biological and research laboratories for the evening session.

The program was devoted to dietary deficiency diseases. Dr. A. D. Emmett gave an illustrated lecture on this subject, covering the history of deficiency diseases, their nature, symptoms and postmortem pathology, means of prevention and treatment. The vitamins were discussed as a whole and then individually, in their relation to the various diseases resulting from their ab-

sence in the diet. The lantern slides illustrating the points brought out by Dr. Emmett were very helpful in making these points clear.

Following this lecture a short paper was presented by Dr. H. Preston Hoskins, entitled "The Veterinarian's Interest in Dietary Deficiency Diseases." The author brought out the importance of a more thorough understanding of the subject of nutrition, especially as pertaining to our farm animals. Various pathological conditions observed among animals, and thought to be nutritional in character, were reviewed and the latest results of the study of these diseases were presented.

At the close of this paper the following were called upon to discuss the subject: Dr. F. W. Chamberlain, East Lansing, Mich.; Dr. E. P. Schaffter, Detroit, Mich., and Dr. J. E. Wurm, Pigeon, Mich. Following this discussion there was a rather unusual "clinic." Dr. Emmett presented a large number of animals showing the effects of restricted diets. Among the symptoms and pathological conditions shown were the following: Anorexia, loss in weight, intestinal disturbances, anemia, malnutrition and marasmus, leg weakness (chickens), edema (rats), polyneuritis (pigeons), posterior paralysis (rats), rickets, osteoporosis and osteomalacia (rats), xerophthalmia (xerosis) (dogs, rats, rabbits, chickens), scurvy (guinea-pigs), faulty development of tooth pulp, dental caries and irregular dentition (guinea-pigs, rats, dogs), endocrine disturbances (goiter, adrenal hypertrophy, testicular atrophy) (pigeons, chickens, rats).

Officers for the ensuing year were elected as follows: President, Dr. H. T. Carpenter, Detroit; Vice-President (Macomb County), Dr. W. L. Drinkwater, Utica; Vice-President (Oakland County), Dr. L. F. Baldock, Birmingham; Vice-President (Wayne County), Dr. J. Hawkins, Detroit; Secretary-Treasurer, Dr. H. Preston Hoskins, Detroit.

The association voted to accept the resignation of Dr. Judson Black, and then proceeded to elect him to honorary membership. Dr. Black is now located at Lansing, attached to the State Veterinarian's office. A vote of thanks was tendered Parke, Davis & Company for the splendid supper and program provided.

H. PRESTON HOSKINS, *Secretary.*

NATIONAL ASSOCIATION, BUREAU OF ANIMAL INDUSTRY VETERINARIANS, METROPOLITAN DIVISION

A meeting of the Metropolitan Division, N. A. B. A. I. V., was held in the lecture room of the Veterinary College, New York University, 331 East 26th Street, New York City, Wednesday evening, April 26, 1922.

Eighteen members were present, President Dr. N. L. Townsend presiding.

The committees on Auditing, Legislation and Program reported progress.

Dr. J. Huelsen, chairman of the Committee on Revision of the Constitution and By-Laws, presented the report of the committee. He submitted a draft of the proposed Constitution and By-Laws, which followed the main features of that of the National Association, with such changes as were applicable to the Metropolitan Division. This was read by sections and, after several changes, was adopted as a whole by the members.

The secretary-treasurer submitted a report of the financial condition of the Division.

The next order of business was the nomination and election of officers for the ensuing year. The balloting resulted in the election of Dr. Albert Long as president, Dr. C. R. Biederman as vice-president, and Dr. E. L. Sander as secretary-treasurer, the latter succeeding himself. The newly elected officers assumed office immediately and in so doing expressed words of appreciation to the members and assurances of their best efforts in behalf of the association.

It was with regret that members learned of Dr. Townsend's refusal to again assume the presidency, as it was felt that the past successful year was due considerably to the great interest and enthusiasm he displayed in the activities of the organization.

Under new business, the question of selecting a delegate to the next national convention at St. Louis, August 28 to September 1, was taken up for consideration. A motion was adopted that a committee of three be appointed to take charge of the nomination and election by mail. Drs. Huelsen, Isaacs and Thackaberry were appointed members of this committee.

Dr. Leland D. Ives' paper on the "Disposition of Carcasses Under Regulation 11, B. A. I. Order 211," presented at a previous meeting was then taken up for further discussion. The discussion which followed was at times quite lively and some interesting points, particularly with regard to the primary seats of tuberculosis, modes of entrance of tubercle bacilli and their dissemination in the body, were brought out. In fact, the subject was found to be so large and the time remaining at this meeting so short that decision was made to continue the discussion thereon at a future meeting.

E. L. SANDER, *Secretary.*

DAIRY CATTLE BREEDERS DISCUSS MUTUAL PROBLEMS

A two-day conference of representatives of pure-bred dairy cattle associations, including the Jersey, Guernsey, Holstein-Friesian, Ayrshire, and Brown Swiss organizations, was called by the Bureau of Animal Industry for May 5 and 6, at Washington, D. C., to discuss problems of mutual interest to all breeders of dairy animals and to the dairy industry. Secretary of Agriculture Wallace and Dr. J. R. Mohler, chief of the Bureau of Animal Industry, addressed the conferees.

The presidents of the five associations were invited to attend the conference and to bring any other representatives they might select. The heads of all these organizations, with the exception of former governor Frank O. Lowden, of the Holstein Association, who is in Europe, were present.

The list of associations and the representatives who attended are as follows:

American Guernsey Cattle Club, Robert Scoville, president, New York; S. M. Shoemaker, Maryland; Karl B. Musser, New Hampshire.

Ayrshire Breeders' Association, Paul O. Reymann, president, West Virginia; C. L. Burlingham, secretary, Vermont.

Holstein-Friesian Association of America, J. A. Reynolds, chairman of executive committee, Ohio; Fred Pabst, Wisconsin; H. W. Norton, Jr., Michigan; D. D. Aitken, Michigan.

American Jersey Cattle Club, M. D. Munn, president, Minnesota; George Sisson, New York; W. R. Proctor, New York; C. J.

Tucker, Missouri; O. H. Baker, New York; R. M. Gow, secretary,

Brown Swiss Cattle Breeders' Association, A. E. Bower, president, Ohio, and L. E. Hull, Ohio.

The conference was arranged to precede the annual meetings of the various associations, in order that early action could be taken on any recommendations that were made by the representatives.

NORTH CAROLINA VETERINARY MEDICAL ASSOCIATION

The date of the next meeting of the North Carolina State Veterinary Medical Association is June 28-29, 1922.

J. P. SPOON, *Secretary.*

MINNESOTA VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Minnesota State Veterinary Medical Association will be held at University Farm. There is to be a joint meeting of the association and a short course given by the University of Minnesota. The sessions will be on July 12, 13 and 14.

We have secured a number of speakers from outside the state, among others being Dr. O. V. Brumley of Ohio State University, Dr. L. A. Merillat of Chicago, Dr. J. N. Frost from Cornell University, Dr. L. Van Es of the University of Nebraska, Dr. H. Lothe of Waukesha, Wis., Dr. H. S. Murphy of the Iowa State College, and several other men have given tentative acceptances.

Evening programs of an entertainment and educational nature are being provided. An interesting and instructive meeting is anticipated.

C. P. FITCH, *Secretary.*

NORTH DAKOTA VETERINARY MEDICAL ASSOCIATION

The North Dakota Veterinary Medical Association will hold its annual meeting at Fargo July 18 and 19, 1922.

R. S. AMADON, *Secretary.*

ILLINOIS VETERINARY MEDICAL ASSOCIATION

The picnic of the Illinois Veterinary Medical Association, together with the Lexington picnic, will be held in Miller Park, Bloomington, Illinois, the latter half of July.

"Watch the July number for dates."

D. E. SISK, *Secretary.*

SOUTH CAROLINA ASSOCIATION

On April 8, 1922, the South Carolina Association of Veterinarians held their annual meeting at the Jefferson Hotel in Columbia. The dinner was followed by a business meeting and the following officers were elected: Dr. W. K. Lewis, President; Dr. T. J. Kinard, Vice-President; Dr. M. R. Blackstock, Secretary-Treasurer.

M. R. BLACKSTOCK, *Secretary.*

EASTERN STATES TUBERCULOSIS CONFERENCE

The annual meeting of the Connecticut Veterinary Medical Association will take place in Hartford, Connecticut, June 6, 7, and 8. In connection with this meeting there will be held a tuberculosis eradication conference of state and Federal employees engaged in cooperative tuberculosis eradication work, as well as practitioners and livestock men from the States of New York, Pennsylvania, New Jersey, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

Following is an outline of the program:

JUNE 6, 1922

(Beginning 9:30 A. M., Daylight Saving Time.)

Opening of the conference, Commissioner J. M. Whittlesey; Address of welcome, Governor Everett J. Lake; introducing Representative Connecticut Veterinary Medical Association to respond to Governor's address of welcome, Dr. G. L. Cheney: response to address of welcome, Dr. A. T. Gilyard; Tuberculosis Eradication Problems in the East, Dr. John R. Mohler; Report of Progress of Tuberculosis Eradication in Each State, Hon. H. M. Tucker, Maine; Dr. L. H. Howard, Mass.; Hon. A. L. Felker, New Hampshire; Dr. J. H. McNeil, Trenton, N.

J.; Hon. Berne A. Pyrke, New York; Hon. Fred Rasmussen, Pennsylvania; Hon. John J. Dunn, Rhode Island.

(Beginning 1:30 P. M.)

Accredited Herd Tuberculosis Eradication Work, Dr. T. E. Munce, Pennsylvania; Dr. L. H. Adams, Vermont; Dr. R. W. Smith, New Hampshire; Dr. P. E. Quinn, Pennsylvania.

Difficulties in Eradicating Tuberculosis in Herds When Infection is Long Established—Dr. H. B. Leonard, New York; Dr. A. J. DeFosset, Vermont; Dr. W. G. Middleton, New Jersey; Dr. G. E. Corwin, Connecticut.

Area Tuberculosis Eradication Work, Dr. T. S. Rich, Michigan.

Discussion by Dr. Elmer Lash, Dr. J. B. Reidy, Dr. E. A. Crossman, Dr. E. T. Faulder.

Avian Tuberculosis, Dr. B. A. Gallagher, District of Columbia.

(Beginning 7:30 P. M.)

The Lymphatic System of the Cow as Related to Tuberculosis, Dr. S. Sisson, Ohio.

Tuberculosis Eradication, Prof. H. R. Smith, Illinois.

Prevalence of Bovine Tuberculosis in Eastern States, Dr. J. A. Kiernan, District of Columbia.

JUNE 7, 1922

(Beginning 9 A. M.)

Tuberculin Testing, Dr. G. E. Corwin, Connecticut; Some Facts Relative to Bovine Tuberculosis Eradication, Dr. E. C. Schroeder, District of Columbia; Necessity of Protection From Infection of Bovine Tuberculosis in the Control of Tuberculosis in the Human, Dr. David R. Lyman, Connecticut; Prevention of Tuberculosis, Dr. Edward B. Hooker, Connecticut; Tuberculosis as a Health and Economic Problem, Dr. John T. Black, Connecticut; Tuberculosis in Children in Various Forms, Dr. Cole B. Gibson, Connecticut.

WEDNESDAY AFTERNOON

Visits to Tuberculosis Sanatoriums.

WEDNESDAY EVENING

Banquet at the Greater Bond Hotel.

JUNE 8, 1922

(Beginning 9:00 A. M.)

Address, Mr. H. P. Hinckley, Massachusetts; Address, Mr. W. S. Martin, Vermont; Some Fundamentals for a Successful Tuberculosis Eradication Campaign, Mr. A. A. Hartshorn, New York; Address, Mr. Joseph Alsop, Connecticut; How the Veterinary Practitioner Is Co-operating in the Movement to Eradicate Bovine Tuberculosis, Dr. Thomas E. Maloney, Massachusetts; Discussion by Dr. Thomas Bland, Waterbury, Conn.; Dr. H. M. Lewis, Nashua, N. H.; Dr. E. H. Bancroft, Barre, Vt., Dr. P. T. Keely, Waterbury, Conn.

THURSDAY AFTERNOON

Visit to Model Dairy Farm upon invitation of Mr. Joseph Alsop, Avon, Connecticut.

OLDEST AGRICULTURAL SOCIETY

The Philadelphia Society for the Promotion of Agriculture held their annual meeting in the Library of the Veterinary School on April 12. This is the oldest Agricultural Society in the United States, having been organized 137 years ago. It has always been very active, has accomplished much in the past, and is doing a great deal of good today. Their library, which is one of the oldest and most valuable collection of books on agriculture in this country, is kept in the Veterinary School Library, where it is their custom to hold their annual meeting. Doctors C. J. Marshall and L. A. Klein were elected curators of the society.

COMMUNICATIONS

ADVERTISING VETERINARIAN NOT AUTHORIZED TO MAKE FEDERAL TUBERCULIN TESTS

To the Editor:

On April 14, I received a copy of a daily paper published in a western state which contained an advertisement of a regularly registered veterinarian who claims over forty years of practical experience. The ad. further gives the information that this man has successfully passed an examination for the purpose of determining his fitness to conduct tuberculin tests, and that "local subcutaneous tuberculin tests" conducted by him will be approved by his state, with payment of state indemnity for reactors found.

This advertisement was forwarded to me with an unsigned query as follows:

"HOW DO YOU RECONCILE THIS WITH YOUR PARAGRAPH 'NO ADVERTISING'?"

On carefully reviewing the advertisement in question, I note that no reference is made to accredited-herd work, but an examination conducted for veterinarians who desired to be entered upon the accredited-herd list is mentioned. The advertiser evidently realizes that he is not eligible to do interstate or accredited-herd testing, although my questioner may be properly excused for not understanding that the word "local" in the phrase "local subcutaneous tuberculin test" refers to geography and not anatomy.

In order to obtain definite information regarding this matter a letter was sent to the State Veterinarian, who replied promptly, stating that the advertiser is a non-graduate and is neither an approved nor an accredited veterinarian in the cooperative tuberculosis work. He, however, has been authorized by the State for local work, but I am informed that he is the only non-graduate in that state who possesses even that authority. All approved and accredited veterinarians doing cooperative tuberculosis work in the various states have received instructions to the effect that their credentials were not to be used for adver-

tising purposes, under any circumstances, but of course the advertiser in question does not come in this category.

My object in sending this letter for publication is with the hope that my anonymous correspondent and any others who may have become exercised over the objectionable advertisement will get to see this presentation of the facts in the case.

J. R. MOHLER,
Chief of Bureau.

NOT CONNECTED WITH IOWA COLLEGE

To the Editor:

We have received a number of inquiries regarding articles written by Dr. G. H. Conn, who is general manager of the Conn Products Company of Waterloo, Iowa.

The Conn Products Company are manufacturers of mineral substitutes for livestock and joultry foods. On account of the impression that Dr. Conn was connected with the Iowa State College in some capacity, I wish to say that he has never had any connection whatever with the Veterinary Division of this institution, either as a student or member of the factulty.

I dislike to write this letter, but I feel that in justice to all concerned it should be clearly understood that Dr. Conn is in no way connected with our work here.

C. H. STANGE, *Dean.*

A FIFTY-ONE-YEAR-OLD HORSE

To the Editor:

Enclosed please find an editorial from the *New York World* of April 20.

It would be very interesting to see the few bolts and nuts that might possibly be in existence fifty-one years after a motor-drawn vehicle was built.

The horse referred to in the editorial is owned by a clergyman at Catawissa, Pa., and is still in very good condition and capable of rendering service. R. M. STALEY.

Philadelphia, Pa.

The editorial is as follows:

"CLOVER, THE OLDEST HORSE

"Accepting the opinion of Dr. R. W. McCully, the experienced veterinarian whom *The World* commissioned to examine the horse Clover, the pride of Catawissa is fifty-one. Very few horses live to be thirty-five. At that age Clover was a youngster. Since those days of his colthood he has put sixteen years behind him and is out to better his record and add to his fame.

"That Dr. Myers, the clergyman who owns Clover, has had him for thirty-five years has been established. Before that he 'was raced as a trotter and worked as a work-horse for ten years,' according to the evidence gathered by Dr. McCully. Only last year he made a trip of ten miles, a remarkable feat for a horse of that age. Whoever doubts it is quarrelling with the facts and may as well admit that he is beaten. There are people that will question the calendar and argue that the sun is ahead of time.

"Clover is fifty-one. He owes it to his good stock, to his good habits, his playful disposition, his sound appetite, regular feed and exercise and the excellent care he has had at his master's hands. It is a partnership that reflects great credit on horse and owner. They have lived together the best part of their lives, are inseparable friends and deserve well of the world."

MISCELLANEOUS

A NEW POSITION FOR DR. YUNKER

Dr. Elkan H. Yunker, of Philadelphia, who has been connected for several years with the State Bureau of Animal Industry, has been appointed field representative for the Pennsylvania Society for the Prevention of Cruelty to Animals, to cover the entire state in the interests of humane work in its relations with the public health. So far as is known this is the first time in the history of the humane movement in this country that a trained technical man has been selected for such a position, and it is expected that great benefit will result from his appointment.

Dr. Yunker will address farmers' institutes, county fairs and other assemblages, to urge the practical advantages of consideration of the health and comfort of horses, cattle, sheep and fowls, economic and humane methods of transportation, disease prevention and sanitation. He will also aid in the establishment of other S. P. C. A. organizations and assist those already formed. Leading veterinarians are in strong accord with the new plan of the Pennsylvania S. P. C. A. and will support Dr. Yunker in his campaign to improve the conditions of farm and town animals, especially those destined for food. Dr. Clarence J. Marshall, former state veterinarian and now a member of the faculty of the Veterinary School of the University of Pennsylvania, voices the opinions of his colleagues when he says that he considers the selection of Dr. Yunker for the post a peculiarly happy one and that the undertaking is one of the greatest moves for public welfare ever put forward by any humane society.

Dr. Yunker was born in Cincinnati, and is a graduate of the Veterinary School of the University of Pennsylvania. Following some twelve years of private practice he entered the state service and was recently representative of that office for the Philadelphia and Delaware county district. Of pleasing personality and great tact, he will bend his efforts to bring about cooperation and understanding between the farmer, the veterinarian, the humane societies, the state and federal inspection boards, and the public, to the ultimate benefit of everyone concerned.

Nearby trips will be made in his own car and he will have interesting moving-picture films of humane activities, to accompany his lectures. The Pennsylvania Society, with headquarters at 922 North Broad Street, Philadelphia, was the first organization for animal relief to be founded in the state and the second in the country. John W. Salmon, a life member, originated the spindle coop, with automatic water and feed trays, for shipping poultry, which has gained Pennsylvania the reputation of transporting fowls more hygienically and humanely than any other state in the Union. The Pennsylvania Society is also practically the founder of the Veterinary School of the University of Pennsylvania, having solicited the first fund to be raised for that purpose.

WORMS IN CATS

By W. J. LENTZ
Philadelphia, Pa.

CATS are subject to tapeworms and roundworms, more frequently the latter. Their presence creates an unthrifty appearance; the fur is harsh, dry and without luster. Usually the appetite is capricious; ravenous if tapeworm is present. Sometimes the animal becomes suddenly crazed with excitement, jumping through a window or madly racing up and down stairs; finally convulsions.

The younger the animals the more intense are the general nutritive disturbances. Diarrhea, anemia, emaciation and a potbellied appearance (which is more pronounced when emaciated) are also often symptoms. Occasionally colicky pain is a pronounced symptom. Migration of roundworms into the stomach of the cat is of frequent occurrence, causing retching, vomiting (vomit is composed of mucus and bile), fetid breath, colicky pain and frequent husky cough. We have on a number of occasions found roundworm infestation in cats ten and twelve years of age.

Treatment.—Whenever a round or tapeworm is to be attacked practically all nourishment should be withheld for at least from twelve to twenty-four hours in order that no food in the intestinal tract may protect the worm from the action of the drug. During this time a little milk may be given, and after a night of fasting, before breakfast, the anthelmintic should be ad-

ministered. In addition all remedies should be followed by purges in order to dislodge the intruder while it is paralyzed, and in many instances it is well to administer a normal saline rectal injection to facilitate removal. Sometimes an emetic of warm salt and mustard water will cause worms to be vomited, but unless the animal is a robust one, it is inadvisable to increase the generally existing irritation of the stomach. Such treatment should be followed by a mucilaginous diet, such as white of egg, barley water, arrowroot, etc., in order to soothe the mucous membrane.

As to the selection of the vermifuge, one should take into consideration chiefly the constitution of the animal. As a rule, those used on the dog will suffice, but in about one-half the dose indicated for dogs—½ to 1 grain of santonine in 2 drams of castor oil or ½ to 1 grain of santonine and 3 or 4 minims of oil of malefern in a dram of olive oil is a most efficacious vermifuge for roundworms. Santonine and calomel from 1/16 to ⅛ of a grain each in repeated doses two hours apart until ½ to 1 grain is given, the last dose to be followed some two to three hours later by castor oil or milk of magnesia; 20 to 30 grains of freshly ground arecanut for tapeworms in milk or with butter, or malefern emulsion, consisting of malefern 1 dram, powdered gum acacea 2 drams, glycerine 2 drams, water 2½ drams; shake well, dose 1 to 4 teaspoonfuls, depending on age.

Treatment of the animal should not stop with the administration of the vermifuge, as it should be borne in mind that the medicaments employed with the idea of destroying the parasites are, of course, likewise in a sense injurious to the host. Therefore, an attempt should be made to rid the system of the drugs used, and, aside from the irritation of the intestinal or gastric mucosa caused by the worms or drugs used, one should consider the effect of the poisonous products formed by certain enzymes of the worms. These cause nervous disturbances and inflammatory changes and perhaps products of decomposition from dead worms. We have found milk of magnesia in repeated dosage to fulfil the above requirements, also because of its tendency to reduce the generally existing inflammation of the gastric and intestinal mucosa. A tonic, such as cod liver oil and iron, is indicated.—*Veterinary Extension Quarterly, U. of P. Bulletin, No. 5, January 7, 1922.*